RAFFERTY-ALAMEDA PROJECT

ENVIRONMENTAL IMPACT STATEMENT

Souris Basin
Development
Authority

CHAPTER 16

HERITAGE RESOURCES

RAFFERTY/ALAMEDA ENVIRONMENTAL IMPACT STATEMENT

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1 INTRODUCTION

The material presented is derived from a series of Heritage Resource Impact Assessments conducted by the Saskatchewan Research Council (SRC) in 1984 for the Saskatchewan Power Corporation (SPC) and in 1986, principally for the Souris Basin Development Authority (SBDA). The work condensed herein reflects the results of over four hundred days of professional fieldwork in addition to a thorough analysis and assessment of other related sources of information.

Early recognition of the importance of heritage assessment and preservation by both project proponents has resulted in the involvement of archaeological authorities throughout the development of the project. While the benefits of this involvement are certain, the nature of the project has resulted in changes in terms of reference and in corresponding adjustments to assessment priorities. Chief among these was the decision to adjust the Rafferty dam site location from line "A" to line "C". This decision followed completion of the heritage assessment report. The majority of information presented therefore becomes less significant in terms of project impact because fewer of the heritage resources identified in this report will now be affected.

Technical terms used are defined in the appended glossary.

1.1 Project Area

For purposes of this assessment, the Project Area, comprises the Souris River Valley between the Nickle Lake Dam and a point just south of Hitchcock; and the Moose Mountain Creek valley from a point just north of the second baseline to a point equidistant between Manor and Carlyle, Saskatchewan. The entire area is located in the mixed-grass prairie ecodistrict, although the Alameda Reservoir skirts along the edge of the Aspen Grove ecodistrict.

1.2 1984 Objectives

Terms of Reference for the 1984 Rafferty study (Saskatchewan Environment 1984) required the archaeological component to address four areas of concern:

a) A complete archaeological survey of the proposed plant site, accessory facilities, and the dam site;

b) A thorough inspection of the interconnecting canal and pipeline routes;

c) Judgemental, surficial and subsurface inspection of high potential zones and systematic or random survey of not less than 20 percent of the anticipated reservoir; and

d) An assessment of the archaeological potential of borrow areas and other off-site facilities which will disturb the soil surface.

After consultation between the SPC, acting on behalf of the Authority, and the Archaeological Resource Management Section (ARMS) of Saskatchewan Parks, Recreation and Culture, concern (c) was revised. The sampling component was discarded and the size of the judgemental survey was increased from 585 ha to approximately 720 ha (a 15 percent sample).

As the 1984 study proceeded, two other concerns were modified. Concern (b) was to be largely disregarded since the location of these features was still not firm. An alternate brief survey was made of the areas where the proposed canal would enter the Rafferty Reservoir and exit the Boundary Dam Reservoir. Similarly, it was decided to disregard concern (d) since the location of these facilities was undetermined.

To satisfy concern (c), the proposed reservoir was subdivided into areas rated as having a low, medium, or high potential to contain heritage resources (Figure 1). The high potential areas were defined as all stream confluences and areas adjacent to these tributaries; the areas adjacent to abandoned oxbows and valley bottom marshes; and the valley summit. Medium potential areas were defined as dry coulee systems; all other areas of valley bottom; and areas located within 2 km of, but not directly on, the valley summit. Finally, only uninhabitable landforms located within the valley; i.e. steep slopes, marshes, were given a low or no potential. From this model, four areas of high potential, comprising approximately 580 ha, and two areas of medium potential,

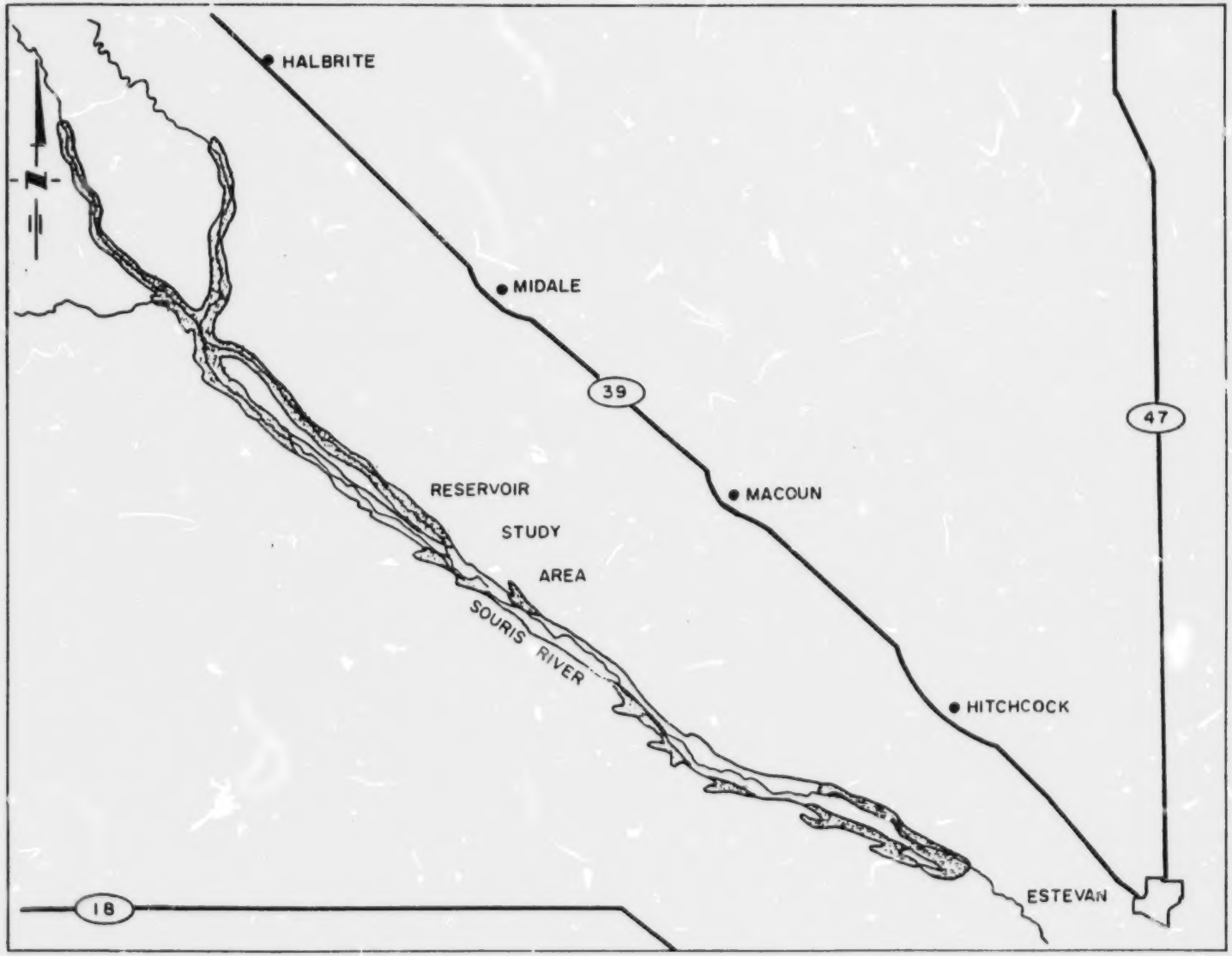

FIGURE 1

AREA OF HIGH AND MEDIUM RESOURCE POTENTIAL (RAFFERTY RESERVOIR)

comprising 135 ha, were proposed for judgemental investigation. These areas were defined as follows (see Figure 2):

High Potential Areas

Judgemental Area 1: Confluence of Jewel and Roughbark Creek to the north end of the Dead Lake Channel

Judgemental Area 2: Dead Lake Channel

Judgemental Area 3: Along ephemeral stream channels

Judgemental Area 4: Dry land bordering the marsh complex near MacDonald Lake

Medium Potential Areas

Judgemental Area 5: Small coulees without developed stream channels (a judgemental sample of 20)

Judgemental Area 6: The banks of the Souris River from Dr. Mainprize Regional Park to the dam site

One landlowner refused access to a major section of Judgemental Area 1, hence, investigation of this area was not completed. Person-days that were to have been used for the investigation of Area 1 were transferred. Instead, investigation of the Souris River extending upstream from its confluence with Jewel Creek, Area 7, was expanded. Like Area 6, Area 7 was judged to be a medium potential area.

Two study components were added. As the maximum Flood Control Level for Rafferty was decreased to 554 m, it was agreed to examine the area between 551.5 m and the 554 m; this became Area 8. Based on previous work in the area, Area 8 was assumed to be a medium-high potential area. Second, the Saskatchewan Research Council (SRC) was requested by SPC to complete an evaluation of heritage resource potential of the proposed Alameda Reservoir.

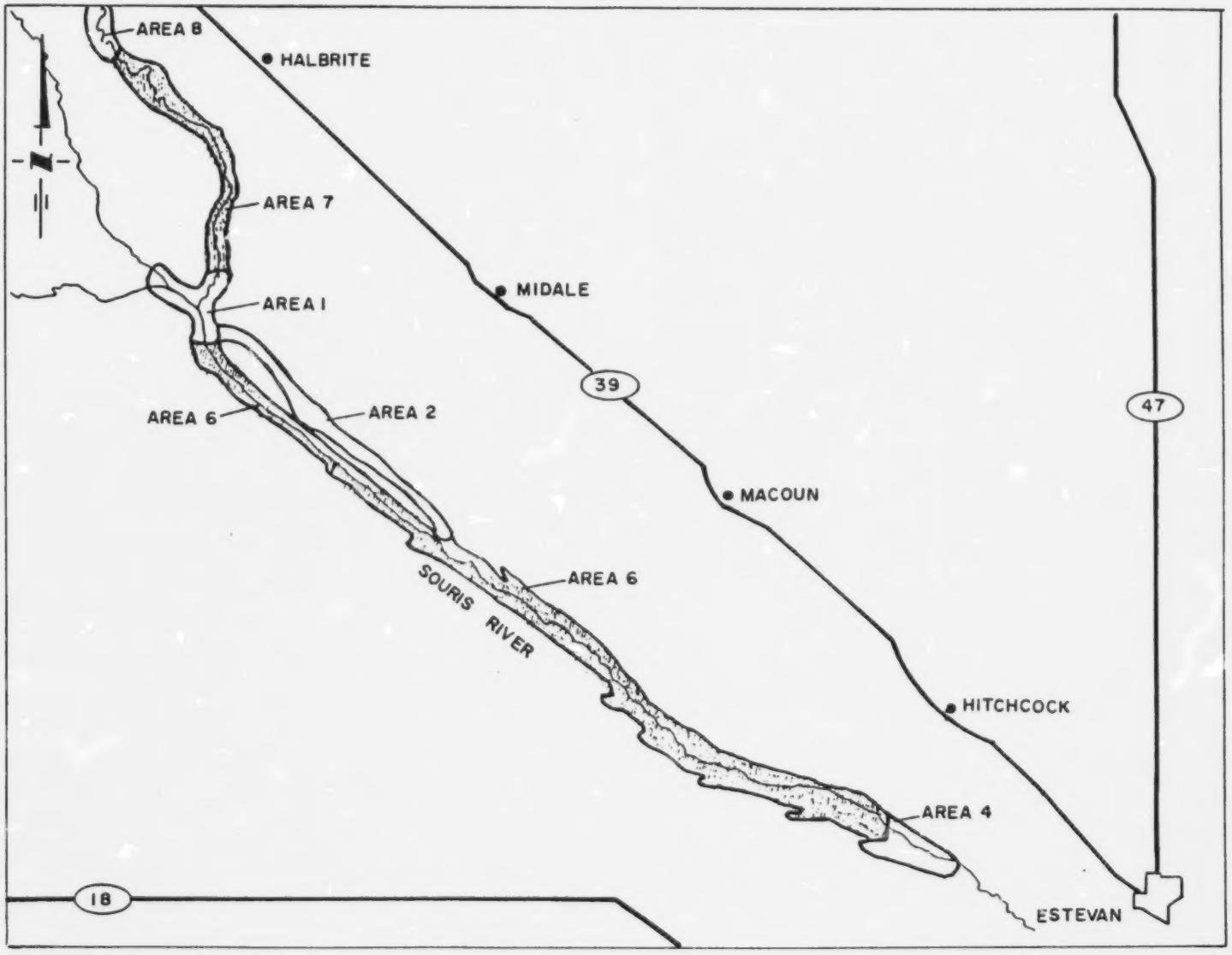

FIGURE 2

1984 RAFFERTY JUDGEMENTAL SURVEY AREAS

1.3 1986 Objectives

In the spring of 1986, Saskatchewan Research Council was asked to complete additional archaeological investigations on behalf of SPC and the Authority. The first objective of this new work was to complete additional assessment and, where warranted, excavations at those resources that would be affected during the first year of project construction (Finnigan, 1986). The areas affected included the plant site, Rafferty Dam site, the Rafferty spillway site, and the proposed borrow pit locations. The second objective was to complete the inventory of that section of the Rafferty Reservoir that would be inundated following the first season of construction. The final objective was to conduct a brief, preliminary inventory of the proposed Alameda Reservoir.

1.4 Methods

.1 Pre-Field Methods

Field investigations were preceded by two activities. For all project components, the Provincial Site Inventory (PSI) was examined to determine what resources were recorded within the Study Area. For the Alameda Reservoir, local members of the avocational archaeological community were contacted by telephone and interviewed regarding their knowledge of the Project Area. This is essentially a land operator survey as described in Section .2.

.2 Field Survey Methods

All project areas, where possible, were subjected to a "land operator survey" as defined by Syms (1982). This involved interviewing people who owned or operated land in the Study Area, as well as members of the local avocational archaeological community.

Three archaeological inventory techniques were employed during these studies: pedestrian transect survey, cutbank inspection, and systematic auger testing. The use of these methods, as summarized in Table 1, varied from area to area depending on local survey conditions. Most areas were investigated using pedestrian transect survey techniques. The exceptions were reservoir survey Area 7 and Area 8 where only the cutbanks were examined (most of the cutbanks were found in these two areas).

TABLE 1

INVENTORY METHODOLOGY BY SURVEY AREA

Area	Method	Comments
Plant Site	Transect Survey	No buried sites[1]
Pipeline Route	--	Not examined
Rafferty Reservoir Survey		
Dam Site	Transect Survey	No buried sites
Division Channel Route	Transect Survey	Not completely examined
Area 1	Cutbank Inspection Auger testing	Access problems
Area 2	Transect Survey	No buried sites
Area 3	Transect Survey Auger testing	
Area 4	Transect Survey Auger testing	
Area 5	Transect Survey Auger testing	
Area 6	Transect Survey	
Area 7	Cutbank Inspection	
Area 8	Cutbank Inspection	Limited fieldwork
Alameda Reservoir Survey		
	Transect Survey	

[1] There was limited soil deposition in these environments. All sites appeared to have surface features and most artifacts were found within the first 15 cm below the sod.

The pedestrian transect survey involved crew members walking parallel to each other across a given target area. The number of transects walked was dependent on the size of the target area and the inter-transect spacing. The distance between crew members varied from 10 m in areas of low site visibility to 50 m in areas of high site visibility. All natural or cultural exposures were checked.

The second inventory technique, cutbank inspection, is a variant of the pedestrian transect survey approach. The cutbanks on both sides of the river were examined for evidence of previous human occupation. Evidence was considered to consist of culturally modified bone, artifacts, or cultural features. The presence of a paleosol was not considered by itself to be sufficient evidence for an archaeological site. For both the cutbank and the pedestrian transect survey approaches, only formed tools or other culturally diagnostic artifacts were collected.

The third survey technique utilized was systematic auger testing. This involved the augering of small holes approximately 15 cm in diameter and approximately one m deep, spaced along a line from one m to ten m apart. All of the fill removed from the holes was screened through six mm mesh.

.3 Site Recording and Assessment Techniques

All archaeological resources were recorded on 1:50,000 topographic maps, on larger scale maps when available, and on Saskatchewan Heritage Resource Record forms. Most resources were then photographed using colour slide film. No systematic surface collections of artifacts were made, but any tools or diagnostic artifacts that were observed were collected.

All sites were classified into two broad categories. The first group consisted of the various surficial forms of Indian and Euro-Canadian stone constructions. Within this group, four specific types of sites were identified and these are illustrated, as well, in the following photographs:

i) Historic Sites

Sites belonging to this class contained a range of historic structural remains including cellar depressions cobble foundations, cobble fences, and standing structures. These features would have served a wide variety of purposes, mostly

within the context of early farming or ranching activities.

ii) Stone Circle Sites

Sites of this type contained roughly circular outlines of rocks These were generally interpreted as the anchoring stones used in conjunction with the hide tipi of the Plains Indians.

iii) Stone Cairn Sites

Sites of this type contained rock piles which ranged in size from small cairns, constructed out of three or four rocks, to large cairns, constructed out of several hundred rocks arranged in several tiers. A wide range of functions has been suggested for stone cairns, ranging from pole supports to burial covers.

iv) Petroform Sites

Sites of this type contained stone constructions that did not fit into any of the above classes. They contained such things as stone circles with large central cairns (this presumably would negate a habitation function) and large oval constructions which may be zoomorphic representations. As with the preceding features, petroforms likely served multiple functions for the Plains Indians.

The second broad category of resources consisted of buried sites. The functional range of buried sites was expected to include habitation sites, faunal processing sites, and faunal procurement sites.

The type of site determined the range of assessment activities that were implemented. All stone feature sites were mapped either by pacing or through the use of a transit and stadia rod. The outside diameter of each feature and its location within the site were recorded. The diameter was either paced or measured with the stadia rod. Shovel tests, auger holes and, during 1986, shallow trenches were used to obtain soil matrices for testing. All stone features were submitted to limited feature recording.

PHOTO ONE: Stone Circle Site
(Photo courtesy Saskatchewan Research Council)

PHOTO TWO: Historic Foundation
(Photo courtesy Saskatchewan Research Council)

PHOTO THREE: A Stone Cairn
(Photo courtesy Saskatchewan Research Council)

PHOTO FOUR: Ratigan Tipi Ring Site - DhMs10
(Photo courtesy SBDA)

PHOTO FIVE: A Stone Effigy
(Photo courtesy Saskatchewan Research Council)

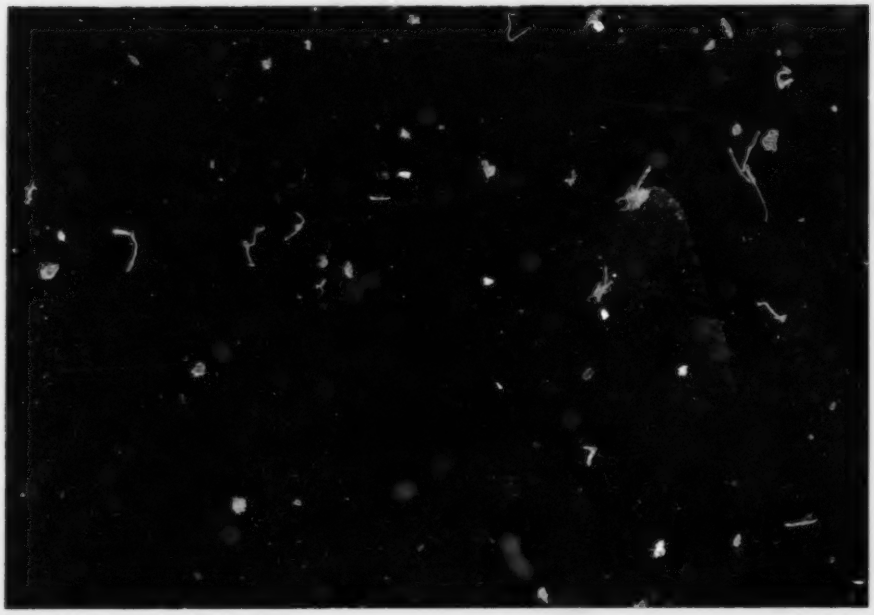

PHOTO SIX: A Buried Camp.
(Photo courtesy Saskatchewan Research Council)

Historic resources were also mapped and the length, width and position of structural remains were recorded. The depths of the cellars, however, were generally not recorded. No testing was carried out at the historic sites and no collections of diagnostic surface artifacts were made.

In 1986, the historic resources that were encountered were recorded on forms provided by the Heritage Resources Branch of Saskatchewan Culture and Recreation. These sites were mapped by pacing and photographed. Area residents were then interviewed as to the age and history of these sites.

.4 Analysis Techniques

Upon the completion of the 1984 fieldwork, the artifacts that were collected were cleaned, described in tabular form, by site, and catalogued later. Artifacts collected during the 1986 field season were cleaned and catalogued using the micro-computer based data management system developed for the Nipawin Reservoir Heritage Study (Gibson **et al.** 1984; Finnigan and Gibson 1985).

An attempt was made to assign significance values to each of the resources encountered during this study. The significance evaluation strategy developed for the Nipawin Reservoir Heritage Study (Burley 1982) was to be used as a model for the present study. Under this system resources were rated in terms of both their scientific and their public significance.

Scientific significance was defined as: "the potential a resource holds to: 1) accurately advance the knowledge of past cultures, peoples, or events, 2) advance the knowledge of other disciplines; and 3) contribute to the solution of theoretical and/or methodological problems within anthropology/archaeology (Burley 1982:51).

Public significance was defined as: "the recognized or unrecognized potential of a resource to contribute to a people's sense of history, place, integrity, religion, and the like. Such value systems also recognize individual resources for their educational/recreational benefits" (Burley 1982:51).

Scientific significance was subdivided into five problem domains: cultural history; subsistence strategy/technological adaptations; settlement pattern; group lifeway; and scientific advancement/methodological significance (Burley 1982:53). Each of these problem domains was considered to be relevant to archaeological study at a regional scale. For each of these problem domains, four essential criteria for the solution were identified (Appendix A).

Similarly, three subsets were defined for public significance: historic/ethnic significance; on-site interpretation significance, and display significance. Three criteria were established for evaluating each of these subsets (Appendix A).

The category of public resource access was evaluated using a scale with a value of 5 denoting direct grid road access and a 0 indicating highly restricted access (Burley 1982:64). For all other categories, a similar 6 point measuring scale was applied. As defined by Burley (1982:60), the equivalent of each numeric value was:

0 - the resource is not significant. This evaluation has been verified.

1 - the resource is not perceived to have significance. However, this has not been verified.

2 - potential is totally unknown.

3 - the resource is perceived to have significance but this has not been verified.

4 - the resource has a verified significance.

5 - the resource is highly significant.

Significance assessment criteria in complete form are presented in Appendix A.

2 RESULTS AND DISCUSSION

2.1. Previous Research

An examination of both the published and the unpublished literature pertaining to the Souris River Basin demonstrates that archaeological inquiry within the Souris Basin, of both a professional and a non-professional nature,

has had a long, albeit sporadic, history. What is likely the first recorded excavation occurred in 1857, when the explorer A.Y. Hind dug into a burial mound to see if it was the remains of a Mandan Lodge (Hind 1971:299). Unfortunately, most early archaeological studies were more closely aligned with looting than with serious research (Syms 1978). To illustrate the frequency at which early work occurred, Syms (1978), has identified 16 different mound excavators who worked in southwestern Manitoba between 1857 and 1930.

Professional archaeological research in the Souris Basin begins with survey work carried out by Boyd Wettlaufer in 1951. As shown in Table 2, the 1950's saw a brief flurry of archaeological research in southeastern Saskatchewan.

Professional research in the North Dakota portion of the Souris Basin began in 1974. All of the North Dakota studies listed in Table 2 were carried out for the St. Paul District of the U.S. Army Crops of Engineers. In 1977, overview studies of the heritage potential were conducted for the Souris River Basin Study and separate studies were completed for the Manitoba and Saskatchewan portions. In Saskatchewan, work in the area has continued to the present. SPC first became involved in southeastern Saskatchewan in 1980 and studies have been completed by Klimko, Finnigan and Wilson.

2.2 Souris Basin Prehistory and History

The Souris Basin itself has a relatively complex culture history which stems from its location along the northeastern periphery of the Plains next to the neighbouring Parkland ecosystem (Syms 1977; Fox 1982). Clovis points, dating to the Early Prehistoric period, ca. 10,500 to 8,000 B.P.* (Dyck 1983:73), have been collected from the Souris Basin in Manitoba, but are absent in both the Saskatchewan and the North Dakota portions, although they are found outside the Basin area. There are a few Folsom finds from the Souris Basin with three Folsom points reported from the Estevan area (Kehoe 1966).

* Before present, 1950.

TABLE 2

PREVIOUS ARCHAEOLOGICAL RESEARCH WITHIN THE SOURIS BASIN

Date	Location	Researcher	Research	Results
1951	Saskatchewan	Wettlaufer	Survey	Recorded Sites
1952	Manitoba	Wettlaufer	Survey	Recorded Sites
1956	Saskatchewan	Metro and McCorquodale	Excavation	Oxbow Dam Site
1957	Saskatchewan	Wettlaufer	Survey	Located 27 Sites
1957	Saskatchewan	Wettlaufer	Excavation	Long Creek Site
1970	Manitoba	Syms	Excavation	Synder I and II
1971	Manitoba	Syms	Excavation	Brockington Site
1972-3	Manitoba	Nash (Syms 1980)	Survey	Located 131 Sites
1974-5	North Dakota	Franke	Survey	
1976	Saskatchewan	Lifeways Ltd.	Survey	Located 1 Site
1976	Saskatchewan	Walker	Excavation	Prehistoric burial
1977	North Dakota	Schnieder	Overview Study	Identified 50 site leads
1977	North Dakota	Good and Fox	Survey	Located 48 sites
1977	Manitoba	Zbeetnoff and Pettipas	Overview Study	
1977	Saskatchewan	Radwanski and Blood	Overview Study	
1978	North Dakota	Loendorf	Survey	Located 1 site
1979	North Dakota	Schweigert	Survey (Historic)	Located 44 sites
1979	Saskatchewan	Aresco Ltd.	Survey	No sites recorded
1980	North Dakota	Good and Hauff	Site Assessment	
1980	Saskatchewan	Klimko	Survey, Assess	Recorded 19 sites
1980	Saskatchewan	PSI	Survey, Assess	Recorded 3 sites
1982	North Dakota	Floodman **et al.**	Survey	
1982	North Dakota	Newberry	Survey	
1983	Saskatchewan	Finnigan	Site Assessment	
1983	Saskatchewan	Wilson **et al.**	Survey, Assess	Recorded 4 sites
1984	North Dakota	Floodman **et al.**	Site Assessment	
1985a	Saskatchewan	Finnigan	Monitoring	Examined 13 sites
1985b	Saskatchewan	Finnigan	Survey, Monitor	Examined 15 sites
1986	Saskatchewan	Burley	Survey, Assess	
1986	Saskatchewan	Finnigan	Mitigation	Mitigated 1 site

[1] Referenced in the Bibliography.

Later Paleo-Indian point styles are better represented. A number of lanceolate points have been found in the Manitoba portion (Syms 1980), the North Dakota portion (Schneider 1982), and the Saskatchewan portion (Hanna, personal communication 1984). While there are no excavated Paleo-Indian sites in the Souris Basin, a Cody Complex site has been excavated near Ponteix, Saskatchewan (Hanna **et al.** 1983; Meyer 1985).

The Middle Prehistoric period, which dates from 7700 to 1850 B.P.* (Dyck 1983:87), is more strongly represented in this region. For the North Dakota portion, based on a shoreline survey of Lake Sakakawea (part of the Missouri Drainage), it has been argued that, "During this period, the habitation of western North Dakota may have reached its greatest extent in terms of numbers of sites." (Good and Fox 1978:36). Materials belonging to this time period are well represented in collections from southeastern Saskatchewan and southwestern Manitoba. Excavated components pertaining to this time period are present at Cherry Point (Haug 1976) in Manitoba and at the Long Creek (Wettlaufer and Mayer-Oakes 1960) and the Oxbow Dam site (Nero and McCorquodale 1958) in Saskatchewan .

The Middle Prehistoric period begins during a warm, dry, climatic episode known as the Atlantic Climatic Episode (Bryson **et al.** 1970). Elsewhere on the Plains, this climatic event was believed to have resulted in either population out-migrations or population reductions (Buchner 1980). Because of its position on the periphery of the Plains region, the Souris Basin is expected to contain Early Middle Prehistoric sites. Sites of this time period, approximately between 7700 and 4700 B.P. (Dyck 1983:92), are characterized by side-notched projectile points belonging to the Mummy Cave Complex and Logan Creek Complex. One resource near the upper end of the proposed reservoir has been assigned to this time period (Finnigan 1985b).

The Mummy Cave Complex is superceded by the Oxbow Complex. Elsewhere on the northern plains, this complex dates to between 4700 and 3050 B.P. (Dyck 1983:96). Oxbow points have been found at both the Long Creek site (Wettlaufer and Mayer-Oakes 1960) and the Oxbow Dam site (Nero and McCorquodale 1958) where they were first defined.

The latter half of the Middle Prehistoric is represented by McKean and Pelican Lake sites in the Basin area. Components belonging to both the McKean and Pelican Lake components date to between 3300 and 1850 B.P. (Dyck 1983: 100, 102).

The end of the Middle Prehistoric period is represented by Sonota and Besant (Dyck 1983 places these in the Late Prehistoric Period). The degree to which these two cultural complexes are related is still cause for speculation (see Neuman 1975; Syms 1977; Reeves 1983). Besant/Sonota components have been recovered from the Bennet site on the Souris River near Ralph, Saskatchewan (Finnigan 1985b).

The Late Prehistoric Period, ca. 2000 to 170 B.P., is marked by the introduction of arrow points and it is the time period to which the mound building tradition belongs. It is also characterized by the use of ceramics, although ceramics were also used by Besant peoples. Variations in ceramic styles have permitted the recognition of considerably more cultural diversity than is recognizable from the stone tool remains. Syms (1978) has subdivided the Late Prehistoric into two periods: the Middle Woodland, ca. 2000 to 1350 B.P., and the Late Woodland, ca. 1350 to 350 B.P. Reeves (1983:14-15) disagrees with the use of the term "woodland" and instead uses the term Late Prehistoric for these two periods. His approach is the one followed here.

The Avonlea Complex marks the beginning of the Late Prehistoric Period. In some areas, Avonlea is thought to be largely contemporaneous with Besant. Other initial Late Prehistoric Complexes which could be represented in the Study Area include the Valley Phase (unlikely) and the Arvilla Burial Complex (Syms 1977).

During the later half of the Late Prehistoric Period, the northwestern plains assemblages are assigned to the Old Women's Phase. The associated ceramic complex is Saskatchewan Basin Ware. Further to the east, and in the Study Area, pottery belonging to the Blackduck ceramic complex occurs (PSI 1980). Other later ceramic complexes which may be found in the Study Area include Selkirk, Cluny, Mortlach, Moose Jaw, and the Devil's Lake - Sourisford burial complex with its specialized ceramic vessels (Syms 1979). In addition, pottery with traits resembling those of the Extended Middle Missouri and the Terminal Middle Missouri (Lehmer 1971) have been found within the Study Area.

The Saskatchewan portion of the Souris River Basin was largely unknown to Europeans prior to the 1870s. This is reflected in early maps of the river. For example, the David Thompson map of 1813-1814 shows the Souris River entering the U.S. but does not show its origin in Canada (Warkentin and Ruggles 1970). Similarly, the 1857 map of Devine and the 1857 map of Arrowsmith show the origin of the Souris River in the U.S. (ibid). In August of 1857, while at Fort Ellice, local Metis told John Palliser about a rock formation at Roche Percee and he made a short trip to the area (Spry 1968:52). The area was subsequently visited by G. Dawson of the North American Boundary Commission in 1872-1876, and by John Macoun in 1880 working for the Government of Canada.

The area under review was only peripherally involved in the fur trade. The closest trading location was an outpost of Fort Ellice which operated for about a decade in the mid-1800s on the north slope of Moose Mountain although posts had been established at the mouth of the Souris River in the late 1700s (Voorhis 1930). It is suspected however, that Metis were hunting buffalo in the area in order to provision the fur trade posts located further to the east (Ross 1957). The area is also known to have been occupied by the Assiniboin (Spry 1968) and the archaeological remains from Long Creek suggest that Plains Village Indians utilized the area - probably the Hidatsa (Byrne 1973). Syms (1977) presents evidence to suggest that a number of different ethnic groups would have utilized the area.

In the late 1800s, a series of Northwest Mounted Police posts were established at Moosomin and Wood End. In the spring of 1887, sub-posts were established at both Alameda and Carlyle (Turner 1950). These posts were interconnected by a series of trails. Other historic trails included the Boundary Commission Trail and the Wood Mountain - Moose Mountain - Fort Ellice Trail. The latter trail crosses Moose Mountain Creek just to the north of the proposed Alameda Reservoir.

Homesteading in the Alameda area dates back to 1882. The homestead quarters in the proposed reservoir have a mean date of patent of 1903. The town of Alameda was founded in 1882 and was incorporated around 1905 (J. Forsyth, personal communication 1986).

Homesteading in the area encompassed by the Rafferty Reservoir began in 1903 and possibly earlier. Settlement in this area is a few years later than settlement in Manitoba and North Dakota. The years from 1893 to 1900 were extremely dry and, as a result, much of the northern plains experienced an economic depression. The influx of homesteaders to the area appears to postdate this period of drought. It is worth noting that the Brandon-Souris-Estevan line of the CPR (1892), the Soo line (1893-94), and the then village of Estevan (1892) all predate this period of homesteading (King 1967).

As farmsteads were beginning to appear within the valley, the first coal mines were developed in the Roche Percee to Estevan area. The deep shaft mine at the Shand site began operation in 1908. Shortly thereafter, the mine was sold to J.G. Peterson who also opened a brick plant at the mine site. Shand eventually developed into a village of brick houses, including a general store, grocery store and post office. The Shand Coal and Brick Company ceased operations in 1938 and the post office closed its doors in 1948 (King 1967). Today, the only standing structure is the house that was occupied by the Peterson family.

2.3 Rafferty Dam Site and Reservoir: Results

.1 Land Operator Survey

Attempts to obtain the names of local collectors in 1984 met with minimal success. This survey component was continued during the summer of 1986 and many of the project landlowners were personally contacted. They were asked if they themselves collected, whether they knew anyone else who collected, and whether they knew the location of any heritage resources within the area. The answers to the first two questions were always negative. The answers to the third question were positive. Most landowners were aware of 'tipi rings' or 'Indian graves' (cairns) located on their poperty.

The apparent paucity of collecting activities within the Souris Valley is interesting. In general, few of the valley resources appear to have been disturbed by artifact collectors. It would appear that while much of the valley is cultivated, in many areas the accumulation of flood deposits is thick enough to obscure the sites. It is suggested that, from a collector's viewpoint, much of the valley is a poor place to collect.

.2 Original Dam Site and Spillway Survey

Eleven resources were located in the line "A" dam site area (see Figure 3a and 3b). As the precise location of the dam was not staked in 1984, approximately 1 km on either side of the valley was investigated.

All of the original dam site area resources were prehistoric in cultural affiliation. Seven of the sites contained stone circles (Borden designations DgMs-30, 31, 32, 37, DhMs-3, 5, 9) and three of the sites contained both stone circles and cairns (DgMs-38, DhMs-6, 7). One site (DhMs-4) contained a petroform in addition to stone circles. The total number of features recorded was 451 stone circles, 44 cairns, and 1 petroform (this includes the 295 stone circles and 41 cairns that were mapped in DgMs-38 in 1986).

Sixteen of the 32 subsurface tests excavated at the original dam site area resources contained cultural material which is summarized in Appendix B. No temporally diagnostic artifacts or subsurface features were noted at any of these dam site resources. In 1986, it appeared that only three of the dam site area resources would be affected (DhMs-3, DgMs-30 and 32). Additional assessment was carried out at these sites. In addition, DgMs-31 was also assessed. No diagnostic artifacts were encountered. 73 test pits were completed here, and an additional 5 m^2 were excavated.

Three sites were located in the spillway area (DhMs-10, DgMs-35, DgMs-36). One of the sites was a stone circle/cairn site (DgMs-36) and two were stone circle/stone feature sites (DgMs-35, DhMs-10). The total number of features recorded was 98 stone circles, 16 cairns and 3 petroforms. Sixteen of the 18 spillway subsurface tests contained some cultural material. Some pieces of pottery (sherds) from DhMs-10 were the only temporally diagnostic artifacts recovered from the spillway. As previously discussed, pottery finds in the Study Area should date between 2000 and 170 B.P.

Six new resources, a farmstead (DgMs-49), a cairn (DgMs-47) and five stone circle/cairn sites (DgMs-46, 48, 50, 51, 52) were located in the dam site and spillway area in 1986. The total number of features recorded was 11 stone circles, four cairns, and one stone feature. No additional diagnostic artifacts were recovered from the dam site spillway area.

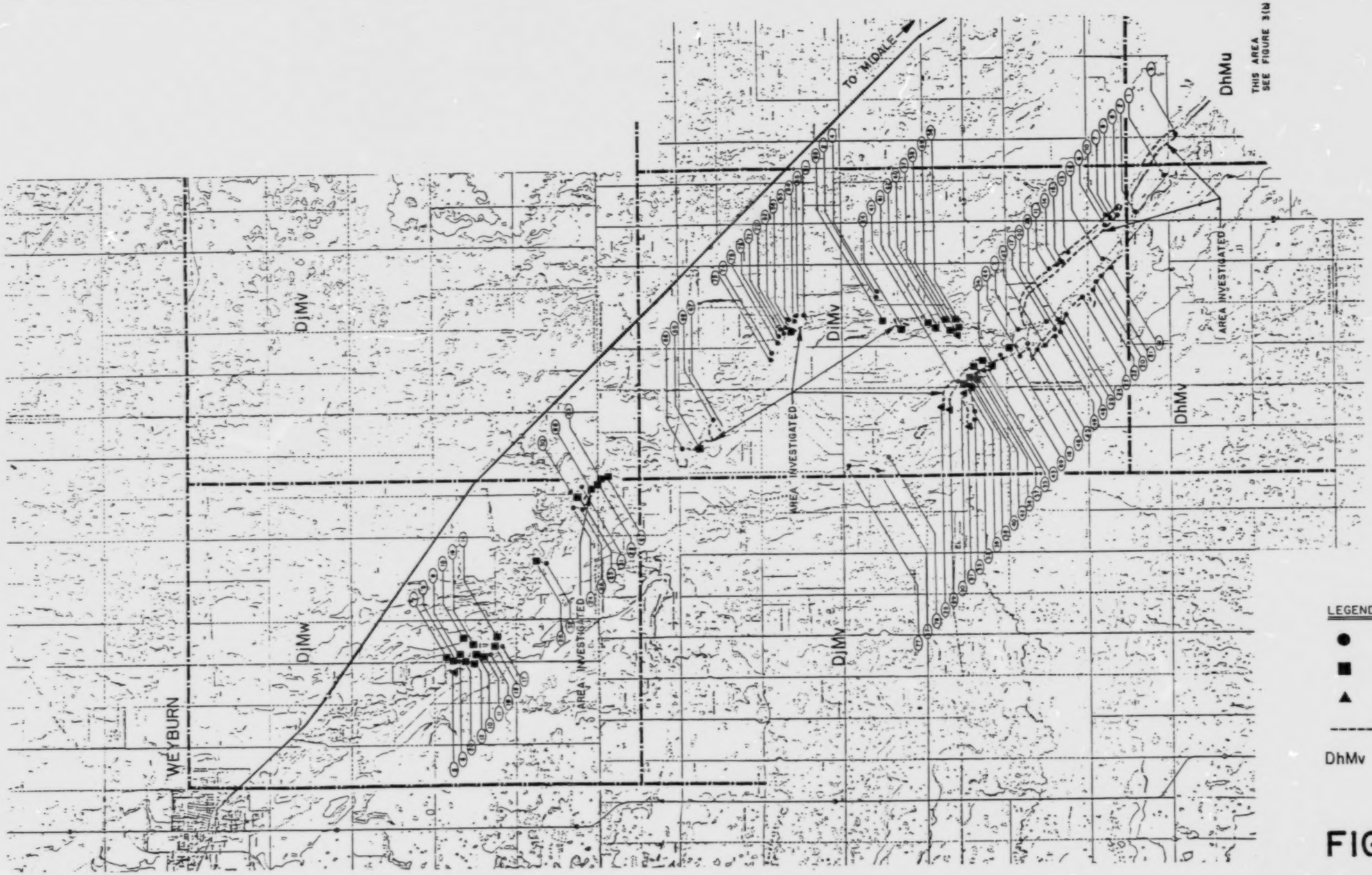

FIGURE 3(a)

DEPT APP'D	DEPT APP'D	DEPT APP'D
REV	REV	REV A

OTHER ENG CHECKS	DRAFTING DEPT
DEPT	DRAWN BY MGH
CHK'D BY	CHK'D BY JB
DATE	DATE 1987-04-22
DEPT	SCALE 1:NE 5000
CHK'D BY	DESIGN DIVISION
DATE	DEPT
DEPT	DESIGNED BY
CHK'D BY	CHK'D BY
DATE	APP'D BY
	DATE

SOURIS BASIN DEVELOPMENT AUTHORITY

RAFFERTY / ALAMEDA PROJECTS

RAFFERTY DAM
RESERVOIR
ENVIRONMENTAL IMPACT STATEMENT
ARCHAEOLOGICAL SITES

PROJ	UNIT	SYST	FUNC	SEQUENCE	REV
A435	140		RVIR	010	A

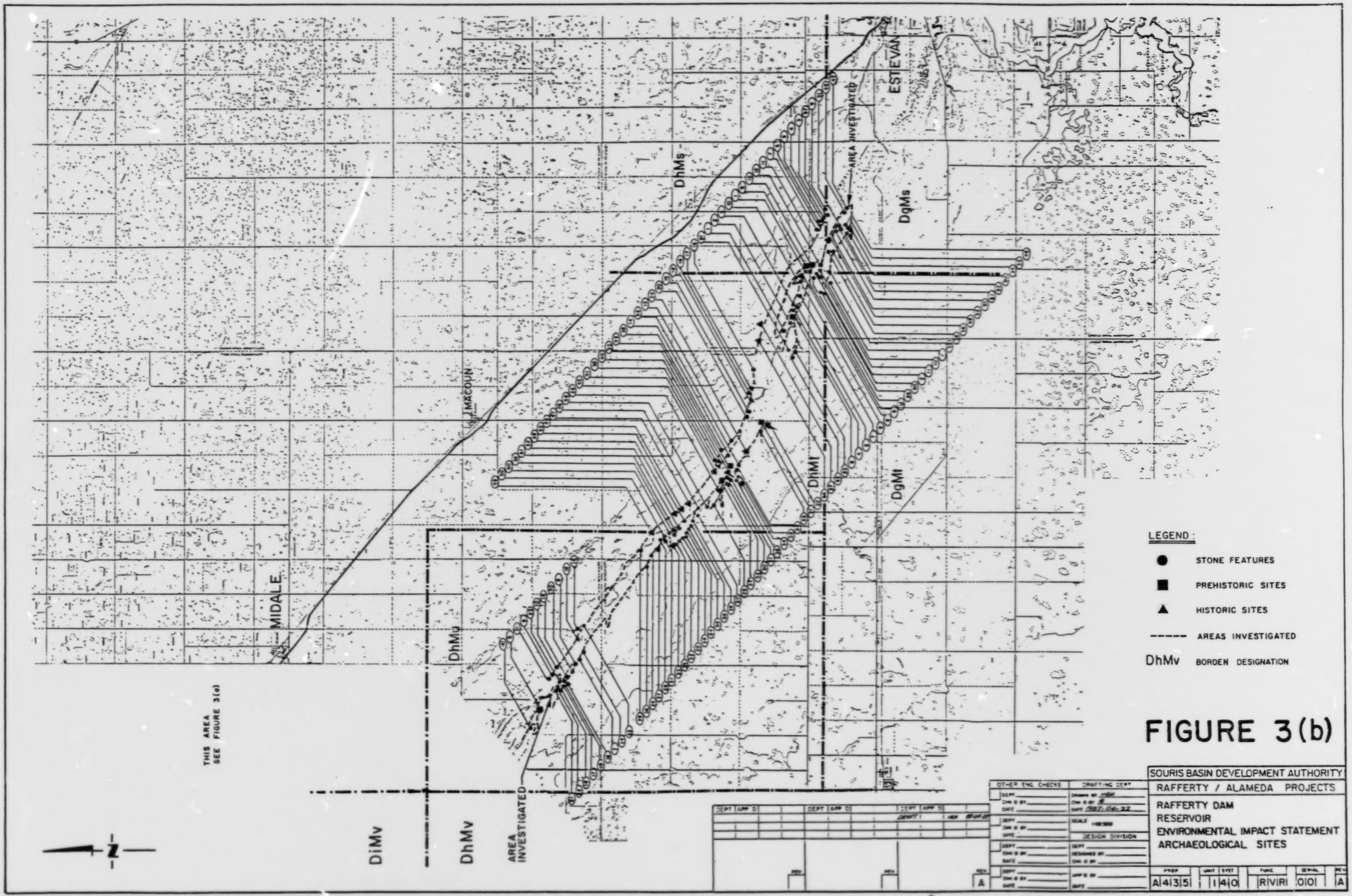

FIGURE 3(b)

SOURIS BASIN DEVELOPMENT AUTHORITY

RAFFERTY / ALAMEDA PROJECTS

RAFFERTY DAM
RESERVOIR
ENVIRONMENTAL IMPACT STATEMENT
ARCHAEOLOGICAL SITES

PROP	UNIT	SYST	FUNC	SERIAL	REV
A4135	140		RIVIR	0101	A

In 1986, additional assessment was completed at DhMs-10, DgMs-33 and 36. Two hundred and thirteen shovel tests were completed and, in addition, approximately 118 m^2 were excavated. The site DhMs-10 (Ratigan Tipi Ring site) is now known to have been occupied over the time period from at least Besant to the early historic period. The line A dam site and spillway resources are summarized in Appendix C.

Since completion of the 1986 work, the dam location has been moved to line "C". As a result, none of the line "A" dam site resources will be affected now but all of the line "A" spillway resources will still be inundated. Only one of the new resources, DgMs-49, will be affected by the line "C" dam and it will be inundated.

.3 1984 Rafferty to Boundary Dam Channel Survey

Although the precise location of the channel route was unknown in 1984, a brief reconnaissance was made of the approximate channel route. Most of the route traversed land that was either cultivated or disturbed through coal mining activities.

Only a narrow strip of land bordering the Boundary Dam reservoir is undisturbed. Some cultural material was noted eroding out of a number of the depressions created by the collapse of old coal mines, but this was not recorded as the area appeared to be located well outside of the proposed right-of-way (ROW).

A brief reconnaissance of the approximate channel route was also carried out in the Estevan-Cambria community pasture. A total of six resources were recorded, including two stone circle sites (DgMt-1, 2), one containing both stone circles and cairns (DhMs-1) and three containing petroforms in addition to other stone features (DhMs-2; DhMt-11, 12). The total number of features recorded was 68 stone circles, three petroforms and 17 cairns. Nine of the 17 subsurface tests completed at the channel route sites contained cultural material (see Appendix B). No temporally diagnostic artifacts were recovered from the channel route sites, but hearth features were encountered at both DhMs-2 and DhMt-12. The 1984 channel route resources are summarized in Appendix C.

One of the 1984 channel route resources, DhMs-2, was also to be affected by spillway construction. Additional assessment here in 1986 produced a Late Prehistoric projectile point along with pottery. Pottery sites within the reservoir date to within the last 2000 years (Dyck 1983). Now that the dam has moved to site "C", this resource will be inundated.

With the Rafferty to Boundary Dam Reservoir channel built at the line "C" dam location, none of the 1984 channel route resources will be affected however, the new route has yet to be surveyed for heritage sites.

.4 Rafferty Reservoir Survey

The reservoir to be created by a dam at line A was subdivided into eight judgemental investigation areas for the 1984 survey. The results of the reservoir survey are subdivided along these same lines. In addition, the valley bottom was augered at a number of locations throughout the length of the reservoir, and these results are presented separately.

In the discussions of the historic resources, reference is made to the date of homesteading, which in the present context, refers to the date of entry (date the property was first occupied). However, some properties were selected for homesteading, no improvements were made, and the property was subsequently abandoned. In this case the dates given refer to the last date of entry preceeding the granting of a patent, or to the first documents that indicate that a house was completed on the quarter section. These dates represent the earliest time period to which the observed structures could date.

i) Judgemental Area 1

That portion of the reservoir between the confluence of Jewel and Roughbark Creeks to the junction of the Souris and the Dead Lake valleys: this area was rated as having a high heritage resource potential but the junction of Roughbark Creek and the Souris River was not examined as access was denied.

Of the 21 sites found, five were historic (DiMv-28, 29, 30, 31, 35), six were buried campsites (DiMv-16, 34, 37, 38, 39, 42), four contained stone circles (DiMv-32, 41, 44, 69), four contained cairns (DiMv-31, 36, 40, 43), and three contained both stone circles and cairns (DiMv-33, 45, 46). DiMv-31 contained both a cairn and historic structure, inflating the site count to 22. The total number of features recorded was 15 historic foundations, 23 stone circles, and eight cairns. 58 of the 91 subsurface tests in Area 1 contained cultural material which is summarized in Appendix B. Four of the sites contained temporally diagnostic artifacts. A Pelican Lake point was found at DiMv-37 and pottery was recovered from DiMv-34, 38 and 42. Pelican Lake dates to between 3300 and 1850 B.P. (Dyck 1983:105). Pottery bearing sites in this area of the province date to between 2000 and 170 B.P. (ibid:110).

The quarter sections on which the historic sites were located were all homesteaded between 1903 and 1915. Three out of the four quarters were homesteaded prior to 1905. The Area 1 resources are summarized in Appendix C.

There were several additional Area 1 historic resources that, while not recorded, are important in terms of local history. The first of these is the Dr. Mainprize Regional Park. This is regarded locally as a heritage resource because the park was built with a great deal of community effort and because Dr. Mainprize was so highly regarded by the surrounding communities. There is also a stone circle and cairn site, which was not recorded, located within the confines of the park. It should be noted that a new park location is being proposed and the feasibility of relocating some of the existing park structures is being examined.

A second resource is an abandoned railroad which travels up the valley of Roughbark Creek. This was a branch line of the Canadian Northern Railway which ran through both Colgate and Goodwater, crossing the Soo Line just south of Midale. This line was abandoned after the flood of 1947 destroyed all of the railway bridges. The significance of this line is that its loss significantly affected the pattern of settlement growth in the Lomond Rural Municipality.

Another potential resource that was not observed during this survey is the location known as Munson's Grove. A number of people mentioned this particular location but there was some disagreement as to whether it was an enclosed structure or an open air pavillion. This is reported to have been a favorite dancing and drinking spot for several surrounding communities and it may have been used for several generations dating back to the early 1900s. Based on the various accounts, it would appear that this site is located on the parcel of land in Area 1 that was unaccessible. It is proposed that future investigations in this area follow up on this information.

ii) Judgemental Area 2

The Dead Lake channel, an abandoned valley segment which contains Dead Lake and a series of large sloughs; the level of Dead Lake is artifically maintained by the Midale Dam: this area was rated as having a high archaeological potential. In addition to the 11 resources recorded during the present study, the provincial site inventory locates DiMv-3 at the northwestern end of the Dead Lake channel. This site was not relocated but the site form mentions that destruction of the site was imminent at the time it was recorded in 1960.

Including the destroyed site, eight of the Dead Lake sites were stone circle sites (DiMv-3, 6, 7, 8, 9, 10, 11, 12), one was a cairn site (DiMv-14), and three contained both stone circles and cairns (DiMv-13, 15, DhMu-3). The total number of features recorded was 112 stone circles and five cairns. Eight of the 25 subsurface tests in Area 2 contained cultural material which is summarized in Appendix B. Projectile points with this form are dated to between 1150 and 170 B.P. on the northern plains (Dyck 1983:126). The Dead Lake resources ar summarized in Appendix C.

iii) Judgemental Area 3

The ephemeral streams that run into the Souris River Valley: the area immediately adjacent to each of these streams, from the river to a point 300 m back, was rated as having a high heritage resource potential.

Three of the 27 Area 3 sites were historic (DhMt-28, 34, 37), 12 were stone circle sites (DhMt-16, 25, 29, 35, 36, 58, DiMv-48, 51, 53, DgMs-33, 34, DhMu-25), two were cairn sites (DiMv-47, DhMu-24), and four contained both stone circles and cairns (DhMt-56, DiMv-49, DhMu-4, 6). In addition, there were six buried campsites (DhMt-22, 23, 43, DhMu-5, 37, 38). In total, 11 historic foundations, 108 stone circles and 24 cairns were recorded. 11 of the 32 subsurface tests completed in Area 3 contained cultural material which is summarized in Appendix B. In addition, a hearth was located in the test excavations at DhMt-25. Pottery was recovered from both DiMv-51, and DhMt-43. Pre-historic sites in the region with pottery date to between 2000 and 170 B.P.

The quarter sections containing historic sites were homesteaded between 1905 and 1913. This narrow range is surprising since the Area 3 drainages are located along the entire length of the 551.5 m reservoir. This suggests that the entire valley was largely homesteaded at a single period of time. The Area 3 resources are summarized in Appendix C.

iv) Judgemental Area 4

Dry land which borders the valley bottom marsh complex located near the Line A dam site: this area was rated as having a high archaeological potential. 13 resources were recorded here. Three of the sites were historic (DhMt-8, 9, DhMs-8), eight were stone circle sites (DhMt-1, 2, 4, 5, 6, 9, 52, 57), one contained both stone circles and cairns (DhMt-7), and one was a buried campsite (DhMt-3). One of the stone circle/cairn sites also contained two petroforms (DhMt-10) and one site contained both prhistoric and historic features (DhMt-9), so the number of different types of sites add to 14 rather than 13.

The total number of features recorded was six historic structural remains, 123 stone circles, four cairns and two petroforms. 14 of the 30 subsurface tests excavated in Area 4 contained cultural material, including a Besant projectile point from DhMt-3 (Appendix B). As previously discussed, Besant in the area of study dates to between 2000 and 1150 B.P.

The single quarter section containing historic sites was homesteaded in 1906. The Area 4 resources are summarized in Appendix B. While investigating this area, information was obtained on two sites which were not located.

The first report was of a large Indian village located near McDonald Lake. This was as specific a land location as could be obtained. It could refer to the large Hinzman stone circle site, DgMs-38, or it may refer to an encampment located on the floodplains that has since been buried.

The second report concerned a sheep camp located in a coulee on the Estevan-Cambria Pasture. No surface artifacts were noted and apparently there were no permanent structures. No subsurface testing was carried out at this location.

The remainder of this area to line "A" was inventoried in 1986. Nine new sites were inventoried including a historic farmstead (DhMt-64), two bison kill/procurement sites (DhMs-12, 13), and six stone circle sites (DhMs-11, DhMt-59, 60, 61, 62, 63). The total number of features involved is 13 stone circles, two cairns, and one stone feature. No additional diagnostic artifacts were recovered.

The change in location from line "A" to "C" adds an additional 560 ha which is proposed to be inventoried.

v) Judgemental Area 5

Twenty small coulees without stream channels: these coulees were rated as having a medium potential to contain archaeological sites. In total, seven resources were recovered. Judgemental Area 5 resources consisted of two historic sites (DhMt-24, DhMu-33), four stone circle sites (DhMu-8, 11, 7, 35), and one stone circle and cairn site (DhMu-34). The total number of features recorded is 11 historic structural remains, 19 stone circles, and one cairn. Seven out of the ten subsurface tests completed in Area 5 contained cultural material which is summarized in Appendix B. A Plains

side-notched projectile point was recovered from DhMu-8. Projectile points of this type date to between 550 and 170 B.P. (Dyck 1983:126).

The two quarter sections containing historic sites were homesteaded in 1907 and 1919. The Area 5 resources are summarized in Appendix C.

vi) Judgemental Area 6

Judgemental Area 6, as defined in the proposal, was to include an area extending 25 m on either side of the Souris River, extending from Dr. Mainprize Regional Park to the dam site. However, since there were very few cutbanks along this area of the Souris River, and since the few that existed could only be found a short distance downstream from the Midale Dam, the boundaries of this area were redefined. The new boundary included the junction of the valley bottom and the valley sides on both sides of the valley.

Area 6 was rated as having a medium archaeological potential and 56 resources were recorded. Included in this total were ten historic sites (DhMt-33, 41, 42, 46, 47, 48, 49, 52, DhMu-26, 27), 30 stone circle sites (DhMt-13, 15, 17, 26, 31, 32, 38, 40, 42, 44, 50, 53, 54, DiMv-26, DhMv-2, DhMu-9, 12, 13, 14, 15, 16, 18, 19, 21, 23, 28, 29, 30, 31, DiMv-50), ten sites containing both stone circles and cairns (DhMt-14, 18, 19, 30, 45, 55, DhMu-10, 20, 22, 36), and three buried camp sites (DhMt-20, 21, 27). Four sites also contained a single petroform in association with other stone features (DhMt-39, DhMv-1, DhMu-7, 17). One site contained both historic and prehistoric features inflating the site count to 57. The total number of features recorded was 30 historic structural remains, 314 stone cairns, 15 cairns and four petroforms.

43 of the 103 subsurface tests completed in Area 6 contained cultural material which is summarized in Appendix B. Temporally diagnostic artifacts were recovered from five of the Area 6 sites. A Duncan point base was recovered from DhMt-21 and a Plains Side-notched projectile point was recovered from DhMu-12. A small pottery sherd was recovered from DhMu-10 and a piece of

glass was recovered from DhMt-32. Finally, some bone which had been cut with a metal saw was recovered from DhMt-26. Duncan projectile points are part of the McKean Complex which dates to between 4150 and 3100 B.P. (Dyck 1983:100). Pottery on the Plains dates to between 2000 and 170 B.P. (ibid:110) while Plains Side-notched projectile points date to between 550 and 170 B.P. (ibid:126). The glass and the sawn bone both date to the historic period.

The quarter sectons in Area 6 that contained historic resources were all homesteaded between 1903 and 1915. The Area 6 resources are summarized in Appendix C. In addition, one site, DhMt-46, was built as a CPR water pumping station (Frank Korvemaker, personal communication 1986).

vii) Judgemental Area 7

The Souris valley bottom between the upper boundary of Area 1 and the end of the 550.5 m Full Supply Level reservoir: this area was considered to have a medium potential to contain heritage resources. Investigation of Area 7 focussed primarily on the examination of cutbanks. In total, 26 resources were recorded. Included in this were two historic sites (DiMv-58, 63), eight buried camp sites (DiMv-56, 57, 59, 60, 61, 62, 63, 64), eight stone circle sites (DiMv-19, 20, 21, 22, 23, 25, 27, 66), four stone circle/cairn sites (DiMv-18, 24, 52, 67), two which contained petroforms (DiMv-17, 68), and three cairn sites (DiMv-54, 55, 65). The total number of features involved is 62 stone circles, 22 cairns, and two stone featurs. One of the sites (DiMv-63) contained both historic and prehistoric features inflating the number of sites to 27. In addition to these sites, DiMv-5, a bone and lithic scatter, had been recorded previously in the area by ARMS.

34 of the 48 subsurface tests completed in Area 7 contained cultural material which is summarized in Appendix B. Diagnostic artifacts were found at two sites. These include two triangular points and pottery from DiMv-61, and some glass fragments and sawn bone from DiMv-56. Triangular projectile points and pottery date to between 2000 and 170 B.P. (Dyck 1983:100). The glass and sawn bone date to the historic period.

Two quarter sections containing historic resources were homesteaded around 1904. The Area 7 resources are summarized in Appendix C.

viii) Judgemental Area 8

The Souris valley between the end of the 550.5 m Full Supply Level and the end of the 554 m Full Supply Level reservoir: this area was rated as having a medium to high potential. Before the 1984 study, seven sites had been recorded in this area by an avocational archaeologist, Rod Sidloski, and by ARMS. Of these resources, one is a stone feature and cairn site (DjMw-26), one is a cairn site (DjMw-24), and the remaining five are buried campsites (DjMw-22, 23, 25, 27, 28). Three of the sites contained diagnostic artifacts. A Besant and several Plains Side-notched projectile points were noted at DjMw-25, a Late Prehistoric point was recovered from DjMw-26, and some Late Prehistoric pottery was recovered from DjMw-27. No subsurface tests were excavated at any of these sites. The Area 8 resources are summarized in Appendix C.

None of the Area 8 resources will be inundated with the dam located at line "C" however, five of the resources (DjMw-22, 23, 24, 25, 26) are located within the maximum flood pool.

ix) Other Reservoir Resources

Since the 1984 survey, and apart from the 1986 survey, a number of additional resources have been recorded. These have been discovered during Heritage Resource Impact Assessment studies for the oil industry (Burley 1985; Finnigan 1986), during ARMS monitoring activities (Germann 1985) and during the 1986 inventory of the first stage inundation zone. In total 26 new resources have been discovered (Figure 8c,d). These include two site types that were not recorded in 1984 survey, a vision quest structure (DiMv-78) and a burial mound (DjMw-30). The oldest projectile point to date in the valley, an early side-notch point, was also found (DiMv-70). An additional 12 stone circle sites (DiMv-71, 72, 73, 74, 75, 76, 77, DjMw-31, 33, 36, 37, 38) were recorded along with three lithic scatters (DiMv-70, DjMw-34, 35). The total number of stone features recorded is 56+ stone circles and 6+ cairns.

x) Auger Testing Program

There were very few cutbanks present along the Souris River between the Midale Dam and the proposed Rafferty Dam which might reveal buried components. In order to test the potential for buried sites in this area, a limited program of subsurface auger testing was initiated. Eight target areas were arbitrarily selected along the river and from seven to 14 auger holes, spaced 10 m apart, were completed at each of these locations. In all cases, the attempt was made to achieve the full penetration of the auger, approximately 90 cm.

As summarized in Table 3, all of the auger holes were sterile. These negative results could result from three or more possible situations:

a) the tests were too shallow;

b) the tests were too infrequent;

c) there is no site potential.

The present data do not support any particular interpretaton however, given that 78 auger holes were completed, it is suggested that there is little potential for discovering sites adjacent to the river channel in these areas.

In addition to the tests along the river channel, auger tests were placed along two ephemeral streams where they emerged from the valley walls. One of the auger holes in each location contained cultural material. These results suggest some potential for buried sites along ephemeral streams and along the valley bottom near the valley walls. The ephemeral stream auger tests are also summarized in Table 3.

xi) Summary of Rafferty Reservoir Resources

At least 720 ha of the proposed line A Rafferty Reservoir were examined during the 1984 survey. Including the nine sites known prior to this study, 170 resources were recorded. Of this total, 25 (14%) were historic, and the remainder were pehistoric in age. The prehistoric sites included 74 stone circle sites (43% of the total), 27 (16%) sites containing both stone circles and cairns, 11 cairn sites (6%), petroform sites (4%) and 30 (17%) buried sites (this adds to 174 as four of the prehistoric sites contained historic features). Seven of the sites containing stone featues also contained petroforms.

TABLE 3

1984 AUGER TESTING RESULTS

Test Area	No. Holes	No. Successful
Tests Along the Souris River Channel		
1	14	0
2	10	0
4	10	0
5a	8	0
6	10	0
7	10	0
8	10	0
9	6	0
Tests Along Ephemeral Streams		
3	7	1
5b	10	1
TOTAL	95	2

Subsequent surveys have increased this number to 196 and at least 900 ha of the line A reservoir has now been examined. The 26 new sites include one burial mound site, one vision quest site, 18 stone circle/stone circle-cairn sites, three lithic scatters, two bison kill/processing sites, and one farmstead.

2.4 Alameda Dam Site and Reservoir

.1 Land Operator Survey

An attempt was made to interview avocational archaeologists in the Project Area in order to gain additional information on the resource base. Seven were contacted along with two members of the professional archaeological community who had worked in this area (Table 4).

TABLE 4

AVOCATIONAL AND PROFESSIONAL ARCHAEOLOGISTS
Contacted in the Alameda Area

NAME	LOCATION
Keith Arnold	Glen Ewen
Michael Bartoff	Oxbow
Ian Bruce	Regina
Jack Dalziel	Oxbow
Carlos Germann	Regina
Bob Grandy	Glen Ewen
Murray Griffin	Alameda
Gordon Moat	Kisbey
Ted Moyes	Alameda

The impression of avocational and professional archaeologists is that Moose Mountain Creek has a high archaeological potential. They report that there are stone circle, cairn, and petroform sites, along with buffalo kill sites and buried campsites. In the immediate Alameda area, a number of sites have produced side-notched points and pottery - considerable quantities in some cases (M. Griffin, personal communication 1986). Further upstream, in the Kisbey-Arcola area, older point styles have been found within the creek valley, including one Paleo-Indian point (G. Moat, personal communication 1986). On the basis of these interviews, it is suggested that this area has the same or perhaps a slightly higher density of sites than the Rafferty area.

.2 Provincial Inventory Search

Due to the paucity of research within the Project Area, only five resources are listed in the Provincial Site Inventory (PSI) (Table 5). Two of the resources are stone feature sites (DiMm-4, DjMn-2), and one of these may contain a burial mound (DjMn-2). One of the sites is a possible campsite locale (DjMn-1), one is a lithic scatter (DiMm-1), and the remaining resource is either a kill or processing area (DiMm-5).

TABLE 5

SITES RECORDED IN THE ALAMEDA RESERVOIR

BORDEN NUMBER	SITE TYPE
DiMm-1	Lithic scatter
DiMm-4	Stone circle site
DiMm-5	Kill/processing site
DjMn-1	Bone midden
DjMn-2	Stone circle/burial mound site

.3 Predicted Resource Base

The proposal for the Rafferty fieldwork presented a generalized model for determining the resource potential of grassland river valleys. In the proposal it was suggested that, on the basis of the various areal and linear estimates, high potential regions would have densities of approximately one resource every 10 ha while areas of medium potential would have a density of one resource very 20 ha (Finnigan 1984).

There were some large divergences from the model estimations that were noted in the Rafferty survey results (Table 6). The one major under-estimation was in the number of sites found in direct association with ephemeral streams (Area 3). The large under-estimation of resources here is a result of the estimation technique utilized. An arbitrary figure of 1.6 investigated hectares per stream channel was chosen and this was multipled by the total number of stream channels. The derived figure, 50 ha, was then divided by the one resource/10 ha estimate used for areas of high resource potential. Stream channels would appear to present a unique case and a more realistic estimate would have been one resource per ephemeral stream.

TABLE 6

ACTUAL VERSUS PREDICTED NUMBER OF SITES

AREA	PREDICTED NO.	OBSERVED NO.
Area 1	29	21
Area 2	15	10
Area 3	5	28
Area 4	8	13
Area 5	2	7
Area 6	5	56

The second major departure was in the number of sites found just along the valley bottom (Area 6). This simply reflects the fact that the boundaries of this area were redefined during the 1984 survey.

Overall, the predicted site numbers correcting the estimates for Areas 3 and 6, were generally higher than the observed site numbers. It is suggested that the site density for medium potential sites should be reduced to one site every 24 ha. The site density for high potential areas should remain the same.

Using the above data, the Alameda Reservoir was subdivided into high and medium potential areas (Figure 4). Nineteen high potential areas, containing 22 stream or intermittent stream confluences are identified in this reservoir. Overall, approximatly 300 ha are rated as having a high resource potential. In total, it is estimated that 32 resources will be located in high potential areas.

The remaining 1900 ha are rated as having a medium site potential. Using the revised figures, 79 resources are predicted to occur.

In total, based on the revised estimates, 111 resources are predicted to be located within the Alameda Reservoir. The actual number of sites could go as high as 167 (applying a 50% one-tailed error) but is not expected to be lower than 111. It is important to note that no confidence level can be attached to this estimate.

Despite a lower percentage of cultivation in the Alameda Reservoir, the distribution of site types here will likely be similar to the distribution observed for Rafferty given the proximity and similarity of the two areas, however there will be differences. Based on an examination of homestead records, it is anticipated that there will be fewer historic sites (6% vs 14%). Similarly, based on discussions with the avocational community, it is anticipated that slightly more buried sites (campsites/kills) will be found than are currently recorded for Rafferty (24% vs 17%) because of more shallow flood deposits. The number of stone feature sites will remain approximately the same. Thus it is anticipated that seven farmsteads, 27 buried sites, and 77 stone circle sites will be recorded in this reservoir.

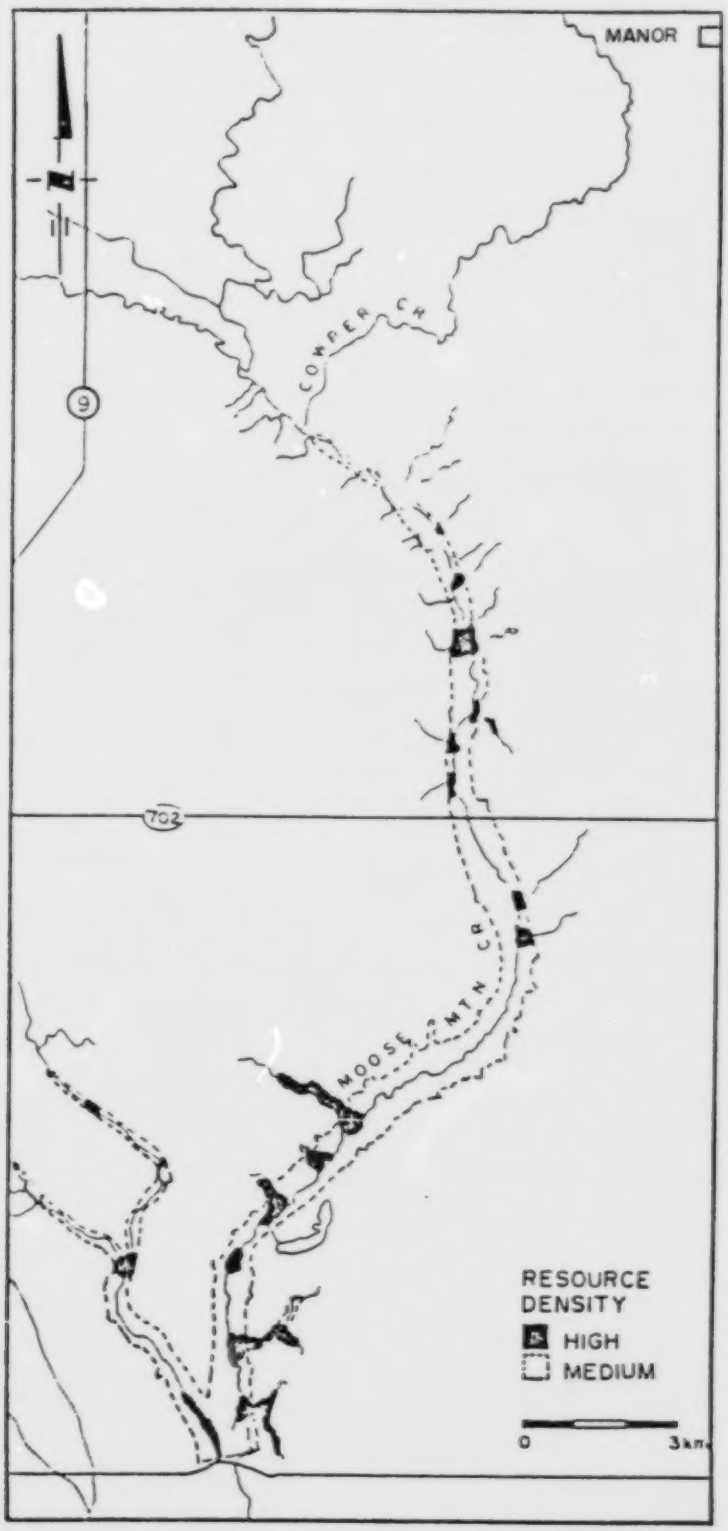

FIGURE 4. Areas of High and Medium Resource Potential (Alameda Reservoir).

In 1986, an overview study was made of the proposed Alameda Reservoir (Figure 5). Although survey conditions were poor at the time (the grass was high, the roads were muddy, and the creek water was high), 11 new resources were recorded (Table 7). Of these, eight were stone circle sites (DiMn-3, 5, 6, 7, 9, 10, 11, 12), two were campsites (DiMm-7, DiMn-4), and one was a findspot (DiMn-8). In addition to the above, several farmsteads were noted but not recorded. The only diagnostic artifact recovered was a Besant point from DiMm-7. However, the level of assessment completed at these sites was quite minimal.

The results of this survey are in line with the predicted resource base (70% stone circle sites). Additional survey will be required to confirm these predictions.

TABLE 7

PRELIMINARY RESULTS OF THE ALAMEDA SURVEY

Field Designation	Site Type	No. Features	No. Assessed	Diagnostics
DiMm-7	Campsite	--	--	Besant
DiMn-3	Stone Circle	3+	2 tests	None
-4	Campsite	--	4 tests	None
-5	Stone circle	4+	2 tests	None
-6	Stone circle	4	2 tests	None
-7	Stone circle	5	2 tests	None
-8	Findspot	--	--	--
-9	Stone circle	1	--	--
-10	Stone circle	5	--	--
-11	Stone circle	8	--	--
-12	Stone circle	10	--	--

DEPT	APP'D			DEPT	APP'D			DEPT	APP'D			DEPT
			REV				REV				REV	

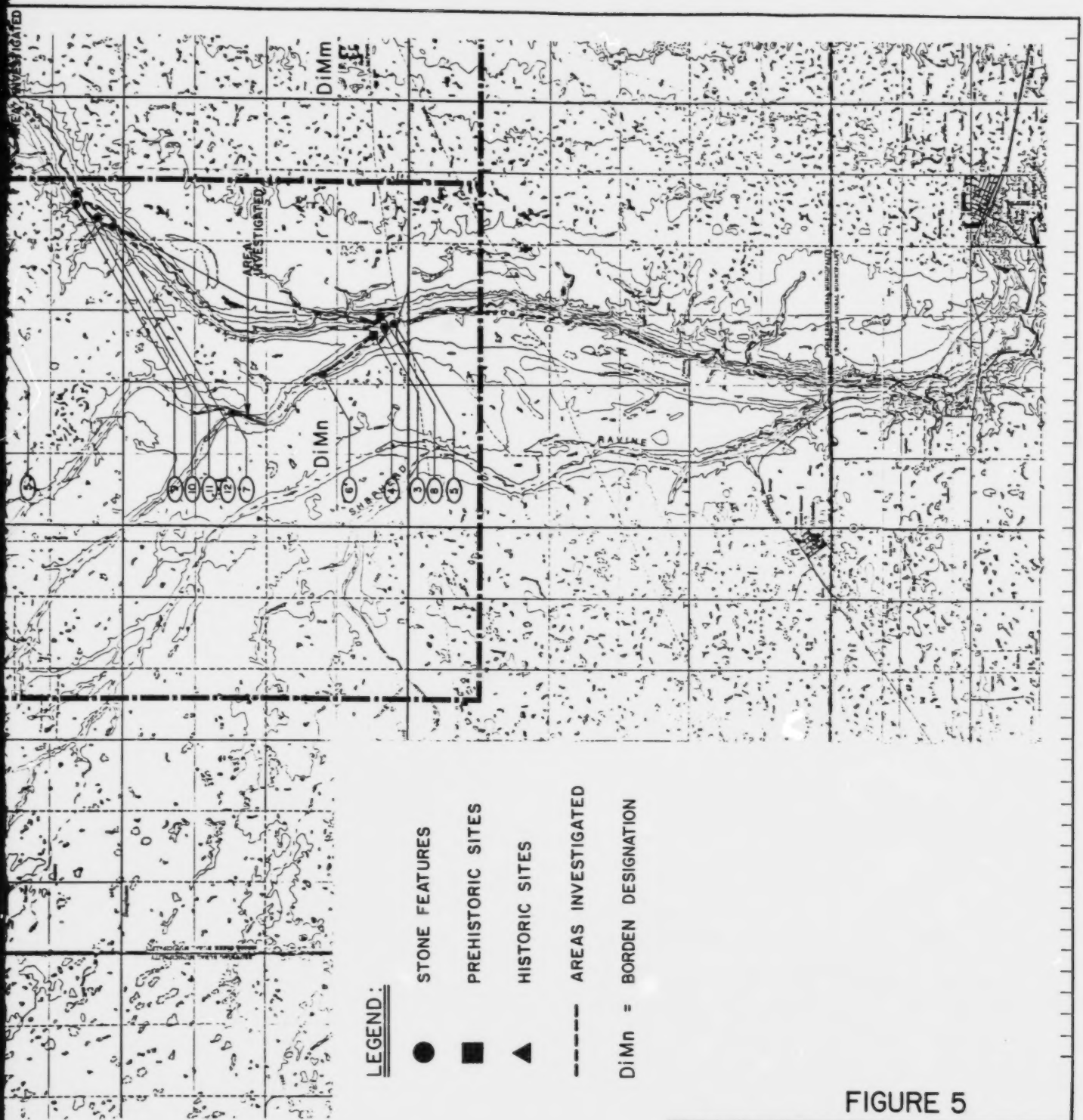

FIGURE 5

APP'D			DEPT	APP'D		
			DRAFT		D.F.K.	87-04-23

REV

REV A

OTHER ENG. CHECKS	DRAFTING DEPT
DEPT	DRAWN BY D KOZORIZ
CHK'D BY	CHK'D BY
DATE	DATE 87-04-25
DEPT	SCALE
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SOURIS BASIN DEVELOPMENT AUTHORITY

RAFFERTY / ALAMEDA PROJECTS

ALAMEDA DAM
RESERVOIR
ENVIRONMENTAL IMPACT STATEMENT
ARCHAEOLOGICAL SITES

PROP	UNIT	SYST.	FUNC	SERIAL	REV
A436		140	RVR	00	A

2.5 Significance of the Survey Results

.1 Regional Significance

River valleys valleys are important elements in both prehistoric and historic settlement systems. In the grassland regions of the province they provided one of the major sources of environmental variation. They also served, at times, as major trade and transportation arteries.

River valleys are only one part, albeit a large one, of a total settlement system. The same river valley was used by different groups both over time and at any one time. Thus research questions directed at the Souris Basin will provide solutions to questions posed well beyond the summit of the present valley system.

At present, the known resource base of the proposed Rafferty and Alameda Reservoirs has considerable potential to answer questions of a regional or possibly an extra-regional nature. One of the important research topics that these sites can address is the identification of the people who were in southeastern Saskatchewan at the time of contact. It is almost certain that some Middle Missouri groups such as the Hidatsa were coming into east central Saskatchewan on a seasonal basis. The Souris River, and then Moose Mountain Creek, would have been the major route followed. Specifically, the frequency, duration, and seasonality of these incursions need to be documented before the prehistory of this region can be interpreted.

Similarly, if such groups were coming up the Souris River and Moose Mountain Creek, to what extent were these valleys a zone of interaction between the more northern nomadic plains bison hunters and the plains horticulturists? The Saskatchewan River in the Nipawin area, for example, has proven to be an intense zone of cultural interaction between peoples of the plains and forest (Meyer 1983).

Moving to the level of the individual site, Appendix D contains a discussion on the research potential of the site types that are currently recorded. There it is suggested that the sample of homesteads represented within the valley has a high research potential because it was created, occupied, and abandoned over a relatively circumscribed period of time (30 years). The homesteads recorded during this study present a good opportunity to investigate early 20th century life in southeastern Saskatchewan.

The prehistoric sites are considered of high research potential. The large number of stone circles and the above average assessment results make this an important research sample that, at present, is without parallel in Saskatchewan or Alberta.

Similarly, the large sample of cairns and petroforms recorded in this study has an extensive research potential. These types of features could contribute to an understanding of group beliefs and settlement patterns.

The buried sites identified during this study appear to range in function from kill/processing areas to campsite situations. In addition, it is known from the excavations at Long Creek that tipi rings are not the only type of habitation remains. The stratified sites will potentially have considerable importance in developing regional chronologies and in studying culture change, particularly during the Late Prehistoric Period.

In summary, the evidence collected to date has demonstrated a rich and varied resource base with an excellent potential to resolve a wide range of research issues over an interrelated set of levels. At this juncture, the legitimate question may be asked as to whether or not these same questions could be addressed along other sections of the same valley systems. The answer is no. Each segment of a river valley is unique. There are differences in the vegetation, terrain, and geography of each segment that will have affected human settlement and therefore the types and distribution of heritage resources. Thus, while the Rafferty and Alameda resource bases share common elements with other areas, they are unique and are not fully replicated in any other area of the Souris Basin.

.2 Resource Significance Evaluations

This section discusses the significance evaluations of recorded heritage resources by project designated area. Detailed tables summarizing the evaluations of each recorded resource, are available in Appendix E.

In discussions that follow, a resource is considered to have a potential for the solution of a given problem domain if the mean rating within that domain is at least three. While this may discriminate against resources which, although they have a potential to contribute to the solution of one aspect of a particular problem, are unable to contribute to other aspects of the same problem, this is countered to some extent by rounding the results. By examining the mean values, the significance evaluations are reduced to manageable proportions. Tables presenting the complete resource-specific evaluations are available in Appendix E.

i) Dam Site/Spillway Resources

Under the general heading of scientific significance, five of the Dam Site/Spillway resources have cultural historical significance, seven have subsistence patterns/technological adaptations significance, eight have settlement pattern significance, six have group lifeway significance, and six have the potential to provide methodological and/or theoretical advances (Appendix E.1). For public significance, four sites are considered to have historic/ethnic significance, four sites are considered to have on-site interpretation significance, and five sites are considered to have display significance (Appendix E.1). Sites DgMs-38, DhMs-4, and DhMs-10 are significant in all or most categories. DgMs-38 is the large Hiznman Tipi Ring site which contains both stone circles, cairns, and stone featues. Sites DhMs-4 and 10 are also stone feature/stone circle sites.

ii) Rafferty Reservoir Resources

93 of the Rafferty Reservoir sites recorded in 1984 are considered to have potential for the solution of cultural historical problems, 81 are considered to have potential for the study of subsistence and technological adaptations, 94 are considered to have potential for the study of settlement patterns, 44 for the study of group lifeways, and 24 are contributing to either methodological or theoretical advances (Appendix E.2 to E.10). Insofar as public significance is concerned, 22 of the reservoir sites are

considered to have historic or ethnic significance, 32 are considered to have potential for on-site interpretation, and 46 have the potential to produce display worthy artifacts.

The sites that are significant across most categories include: DiMv-38, DiMv-35, DiMv-61, DiMv-63, DhMt-28, DhMt-34, DhMt-46, DhMu-8, DhMu-12, DjMw-26 and DjMw-27. Five of these are historic homestead era resources, three are buried campsites, and three are stone circle sites.

Of the reservoir resources recorded since 1984, ten are considered to have potential for the solution of cultural historical research questions, nine are considered to have potential for the solution of subsistence and technological adaptations, 13 have potential for the solution of settlement pattern research questions, five for the study of group lifeways, and five are considered to have potential for methodological and/or theoretical advancement (Appendix E.10). For public significance, five are considered to have historic or ethnic significance, four are considered to have potential for on-site interpretation and four are considered to have display sgnificance. In general, the level of asessment information on which these evaluations are made is quite low.

The most significant sites include DiMv-78, a vision quest site, DjMw-30, a burial mound, DjMw-31, a large cairn, and DhMs-12, the Sanderson Kill site.

iii) Alameda Reservoir Resources

At present, the level of assessment information on the Alameda Reservoir resources is quite low. Given this caution, at present four resources have cultural/historical significance, four have subsistence and techological adaptation significance, two have settlement pattern significance, three have group lifeway significance, two have methodological/theoretical advancement significance, one has historic/ethnic significance, one has on-site interpretation significance, and two have display significance. The most significant resources recorded to date are DiMm-5, a possible bison kill and stone circle site, and DjMm-2 a stone circle and a possible burial mound site.

.3 Discussion

As was done for the previous Nipawin Study, the aggregate values for each category with the scientific and public resource evaluations were plotted as a series of bar graphs (Figure 6). For the categories of cultural historical significance, subsistence, and settlement pattern, the aggregate totals approach a normal distribution centered at ten. The graph of group lifeway values is more noticeably skewed and the mean is nine. The remaining graphs are all tri-modal to some degree with peaks at totals of 3, 6, and 9 (evaluations of 1, 2 and 3). It is suspected that this results from biases in rating resources in terms of these latter categories. For these, resources were most frequently classified as having no, unknown, or suspected potential, rather than confirmed potential.

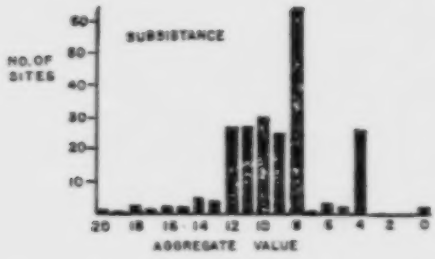
After completing the same exercise for the similarly sized Nipawin sample, Burley (1982:66) stated:

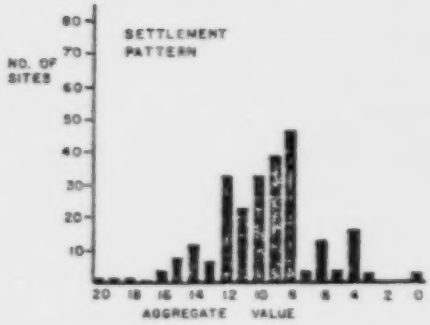
> "In this regard, the current evaluation suggests that the data base is best suited toward cultural historical research with at least limited potential to address subsistence/technological adaptation and settlement pattern questions."

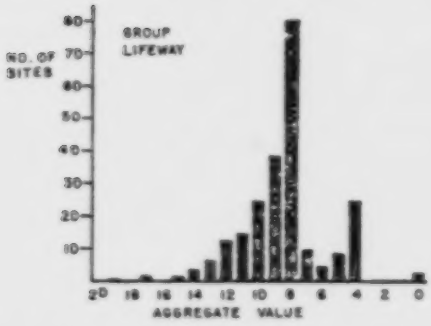
The present data base shows a somewhat higher potential to address not only culture/historical, but subsistence/technological, settlement pattern, and group lifeway problems. The principal reason for this is that a large percentage of the Nipawin data base had been damaged by agriculture (Burley 1982). The Rafferty resources, in comparison, are largely undisturbed.

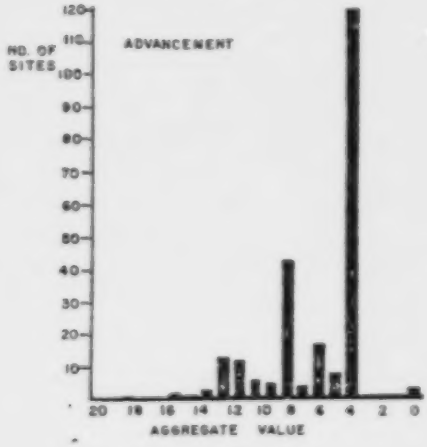
2.6 Conclusions

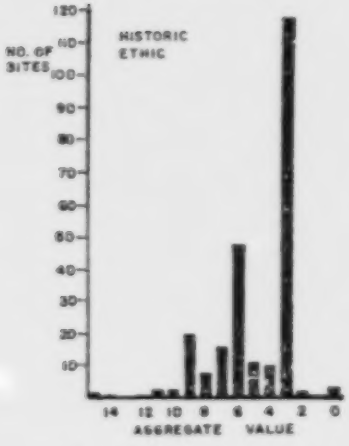
The heritage resources recorded to date are only a sample of the total resource base, but they are thought to be representative of the range of sites that will be recorded. A wider range of site ages is anticipated as more assessment information is obtained. The following discussion presents resource estimates for each of the project components and presents some concluding remarks on these.

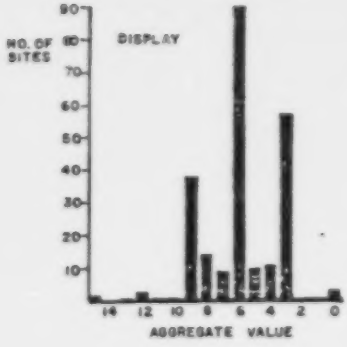


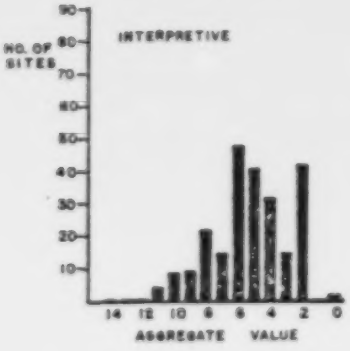












RESOURCE BASE
SIGNIFICANCE DISTRIBUTION
FIGURE 6

.1 Rafferty Reservoir

As only a judgemental survey of the Rafferty Reservoir was conducted, it is not possible to provide estimates of the total number of sites with stated levels of confidence.

The total area examined during the 1984 and the 1986 surveys was approximately 900 ha, or 14% of the maximum full supply reservoir area (555 m Full Supply Level) at line "A". Most of the survey area, 580 ha, was considered to have a high heritage resource potential. Some of the remaining unsurveyed areas also have a high research potential, and it was estimated that high potential areas make up about 15% of the reservoir (945 ha). The reservoir created by a dam at line C will only inundate 3,840 ha at Full Supply Level. Although some medium potential area is being added at the downstream end, the overall percentage of high (15%) and medium (77%) and no potential areas (disturbed areas, standing water -8%) appear to apply. The total number of sites predicted for the Rafferty Reservoir is 181. Since there are already 166 sites located at or below Full Supply Level, this estimate is conservative. As for Alameda, this estimate could also err on the low side by as much as 50% (181 to 272 resources with no attached levels of confidence).

The ratio of different site types calculated for the surveyed areas of the Rafferty Reservoir is assumed to hold true for the unsurveyed areas based on preliminary observations. The high number of sites containing stone features was surprising since a large portion of the valley has been cultivated (24%). These sites are easy to detect at a fairly low level of survey intensity and, as such, are possibly over represented in the sample. Still, it is anticipated that, in terms of percentage, the number of sites containing stone features will remain approximately the same (65% or an estimated 118 sites).

The areas of the reservoir with the best potential to contain buried campsites were given the least amount of coverage. In addition, because these sites are difficult to assess, the number of components is likewise under-represented. Therefore, it is estimated that the overall percentage will increase to around 20% (36 sites).

Finally it is predicted that the number of historic resources will remain around 15% (27 resources).

.2 Alameda Reservoir

The Alameda Reservoir was not surveyed in 1984 and only briefly examined in 1985. At present, 16 heritage resources are identified within the Alameda Reservoir. Based on the predicted model, a minimum number of 111 resources is predicted to occur within the Alameda Reservoir (estimate of 111-167 heritage resources with no attached confidence level). The distribution of site types here will likely be similar to the distribution observed for Rafferty. It is anticipated that seven farmsteads, 27 buried sites, and 77 stone circle sites will be recorded in this reservoir.

.3 Discussion

Some basic observations can be made about the temporal range of the sites recorded during this study and those sites anticipated to be recorded in future studies.

At present, no Early Prehistoric sites have been recorded within either reservoir. The potential for finding sites from this time period is moderate to low since these components, if they are on the valley bottom, will be deeply buried. However, given the paucity of Early Prehistoric finds in the Souris Basin and southeastern Saskatchewan in general, any finds dating to this time period would be rated as significant.

The Middle Prehistoric period is better represented. One early Middle Prehistoric site has been found. In addition, three sites dating to the latter half of the Middle Prehistoric period were recorded: one McKean and two Pelican Lake Complex sites.

The potential for finding additional Middle Prehistoric age components, given their abundance elsewhere in the Souris Basin, is judged to be quite high. Indeed, it is possible that some of the undated components already recorded by this study will belong to the Middle Prehistoric.

The first half of the Late Prehistoric period is, at present, represented by only one component. A number of sites contain pottery but, given the small size of most of the recovered sherds, it is difficult to determine their age. The potential of finding additional sites dating to this time period is judged to be quite high.

Only two components are currently assigned to the latter half of Late Prehistoric or Late Woodland period. The same problem identified for the pottery applies here. Again, the potential of finding additional sites dating to this time period is judged to be quite high.

None of the historic structures identified during this survey date to the pre-settlement period of the Study Area. However, two tipi ring sites contained historic goods and a third contained bone that had been cut with metal tools. These sites may relate to early historic bison procurement by either Metis or Indian groups. The potential of finding sites which date to this time period is estimated to be medium to high.

The settlement period is well represented by 27 resources. The potential of finding additional historical resources is judged to be quite high.

Many of the archaeological sites located during this study are unique in some respects and may not be replicated elsewhere within southeastern Saskatchewan. A more thorough understanding of these resources would make a significant contribution not only to the archaeology of southeastern Saskatchewan, but to the adjacent areas of northwestern North Dakota and southwestern Manitoba. Thus the heritage resources identified during this study can be said to have both inter-provincial and international significance.

While the heritage resources recorded during this present study are important for their potential contributions to scientific knowledge, they also represent a substantial, but undeveloped, public educational tourism potential. The entire southeastern corner of the province has not substantially developed its heritage resources. Neither Oxbow or Alameda have museums. The City of Estevan has a new exhibition center but does not have any permanent exhibits of local heritage (although this is changing). The Soo Line Historical Museum in Weyburn has a small display of native cultural history and a good display of artifacts dating to the post homesteading period. The Soo Line Museum reports that it had 2,740 visitors, some from as far away as Australia, and that it had handled 1,865 requests for tourist information (L. Stepp, personal communcication, 1984).

Museums are only part of the heritage potential for tourism. Sites like the Shand site, or large stone circle sites like DgMs-38, or specialized stone feature sites like the Alameda Ceremonial Circle (DhMn-9) have the potential to be developed into heritage parks. The success of these developments is attested by the success of the Strathcona Science Park (Ives 1985; Newton and Pollock 1985; Pyszczyk 1985) in Edmonton, and by the interest shown in the development of Head-Smashed-In near Fort MacLeod, Alberta (Brink **et al.** 1985) and the Wanuskewin Heritage Park in Saskatoon. There are substantial public benefits in the heritage resource base of this region, but they need to be developed.

3 ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Environmental Effects of the Rafferty Reservoir

.1 Construction

Had line A been chosen, dam construction activities would have affected or completely destroyed sites DhMs-3, on the north side, and DgMs-30, 31 and 32 on the south side of the Souris Valley.

Fill for the dam at line C will be derived from the excavation of the spillway channels and the construction of the operational and the emergency spillway, road access, and the channel regrading may have an adverse impact on heritage resources. Thus, construction of the dam at line C will impact a number of heritage resources but the actual number is uncertain. It is proposed to determine the number of resources that will be affected by conducting an inventory during 1987.

.2 Operation

All of the heritage resources located within the reservoir will be affected by inundation related impacts. The National Reservoir Inundation Study (Lenihan **et al.** 1981a; 1981b), has identified a wide range of reservoir processes which affect heritage resources at three levels: the regional resource base, the individual resource, and the resource constituents (Table 8).

TABLE 8

RESERVOIR IMPACTS ON HERITAGE RESOURCES[1]

Impact Categories	Archaeological Resources		
	Large-Scale Data: Regional ecological considerations such as geomorphology, settlement patterns faunal and floral distributions.	Medium-Scale Data: Site contextual data, stratigraphic and spatial relationships within a site.	Small-Scale Data: Differential impacts on common cultural materials including artifacts, features, analytical properties, etc.
Mechanical Impacts	Mechanical (siltation and erosion) and biogeochemical impacts to the reservoir drainage basin, including gross geomorphological changes; impacts to preinundation floral and faunal communities, etc.	Near-shore wave action, erosion and siltation of sites and site deposits.	Mechanical abrasion, freeze-thaw, and wet/dry impacts to artifacts and other cultural materials.
Biochemical Impacts		Biochemical alteration of site soil and contextual relationships.	Differential biochemical deterioration of archaelogical material categories.
Human and Other Impacts	Dam and borrow pit construction, roads, clear-cutting, etc.	Vandalism, recreational use. Impacts to shoreline by grazing animals; impacts by invader plant species, etc.	Removal of selected artifacts by collectors, etc.

[1] From Lenihan **et al.** 1981:208

Lenihan **et al.** (1981a:208) advocate a zonal approach to identifying reservoir impacts. The five reservoir zones are the permanent conservation pool, shoreline fluctuation zone, upper flood pool zone, backshore zone and downstream zone.

For the Rafferty Reservoir, the shoreline fluctuation zone will fluctuate between 548 and 549.5 m asl in the initial reservoir operation and between 549 and 550.5 after that. The upper flood pool will fluctuate betwen 550.5 and 554 m asl (albeit infrequently and over a short period of time). Resources located below 548 m will lie in the permanent conservation pool. The size of the backshore zone and the downstream zone is unknown. The number of resources located in each of these zones is summarized in Table 9.

At the regional level the heritage resource base is affected across all five zones. Individual resources are also affected across the reservoir zones, but the effects of the various reservoir processes are not equal. The effects on resources located within the downstream zone are unknown at this time but the anticipated impact is increased erosion.

At present, only two resources (DjMw-27, 28) can be considered as being located in the backshore zone, however, the exact limits of this zone are unknown and most of it has not been inventoried.

It is anticipated that the 92 resources located in the permanent conservation pool will be most severely affected by the loss of access.

For the 74 heritage resources located in the shoreline fluctuation zone, it is anticipated that most impacts will result from wave-induced erosion.

There will be some impoundment after the first year of construction. Regardless of what level is reached, some heritage resources will be exposed to wave erosion for the better part of a year.

In the upper flood pool zone, "some erosional and slumping impacts may occur" (Lenihan **et al.** 1981a:212). As flood waters will be held for a relatively short period of time, the level of impact here is not anticipated to be as great as that experienced in the shoreline fluctuation zone. At present seven resources are recorded within the upper flood pool.

TABLE 9

DISTRIBUTION OF RAFFERTY SITES BY RESERVOIR ZONE

Zone	No. of Sites
First Year Shoreline Fluctuation	89*
Shoreline Fluctuation Zone	74
Inundated Sites	92
Upper Flood Pool	7
Backshore	?
Downstream	?

* These sites will be inundated in the second year.

At the level of individual site constitutents, Lenihan **et al.** (1981a) have identified a number of biological and chemical processes which can have a major impact on site constituents. Pollen, seeds, wood, bone, and low-fired ceramics can all be adversely affected by inundation processes.

A major ancillary impact resulting from the operation of the reservoir will be an increased rate of vandalism resulting from increased access (by boat), and increased visitation. Secondly, individual resources, as exposed during the reservoir drawdown, may be affected by animal traffic, in particular by cattle.

3.2 Environmental Effects of the Alameda Reservoir

.1 Construction

As baseline studies have not been completed for this project component, resource specific impacts can not be identified at this stage. Construction at the dam site currently proposed however would affect at least two sites.

17 potential borrow areas have been identified for this project. None of these areas have been inventoried for heritage resources but there are two identified conflicts. Expansion of one potential borrow area will impact DhMn-3, a tipi ring site, while expansion of a second will impact DhMn-2, also a stone circle site. At least some additional impacts are forecast from the development of the other borrow areas.

.2 Operation

Heritage resources located within the Alameda Reservoir will be affected by the same reservoir processes outlined in the previous section.

At the level of individual resources, some impacts can be anticipated at both the backshore and the downstream zones. In the permanent conservation pool, the impacts here will be the same as those previously discussed. In the shoreline fluctuation zone, wave erosion will be the major mechanical impact.

The impacts in the upper flood pool will be similar to those discussed for Rafferty. Mechanical impacts to sites may be more severe as maximum Full Supply Level will be held for a longer period of time than at Rafferty.

Like Rafferty, resources located adjacent to the Alameda Reservoir can expect increased vandalism. Impacts will be magnified as the reservoir is developed for recreation.

3.3 Mitigative Measures

Mitigation options for heritage resources include avoidance, preservation, and investigation. At this stage in project planning, avoidance has limited application. Thus, while it is unlikely that major project components would be relocated, site avoidance may be possible for smaller subcomponents such as individual borrow pits and access roads.

Resource preservation is a second option, but as pointed out by Lenihan **et al.** (1981a:5), "site protection is rarely a less expensive option than field testing and limited excavation." In addition, preservation is rarely complete, as some elements of the resource base will almost inevitably be lost (ibid). Further resource preservation is only a viable option when there is some provision for continued access to that resource. In situations where the first two options can not be exercised, resource investigation is the preferred mitigation option.

In some instances, due to costs, scheduling, and available manpower, there may be no mitigation options. Where necessary, the decision not to mitigate a resource should, "...be made on the basis of information redundancy, site disturbances, and research potential." (Burley 1982:73).

.1 Construction

As the Alameda resource base is essentially unknown, a complete resource inventory will be necessary before mitigation options can be assessed. Therefore, it is proposed that a heritage resource inventory and assessment of the Alameda Reservoir precede the start of dam construction in 1989.

Similarly, due to the proposed construction schedule, first stage inundation of the Rafferty Reservoir will take place in 1988. It was recommended that the first stage inundation zone be inventoried during the 1986 field season and this has been completed. The inventory of the remainder of the reservoir could be completed during 1987 or 1988 at the latest.

Beyond this, some resource specific mitigation strategies can be discussed. Sites that are located in immediate impact zones must receive additional assessment and, where warranted, these sites should be mitigated.

The North Dakota guidelines for stone circle sites could be viewed as the minimum level of baseline assessment. In order to plan site mitigation, some additional assessment will be required.

Some sites will be directly affected by the construction of Rafferty Dam at Line C. These sites received an increased level of assessment in the summer of 1986. Additional excavation has been recommended for DhMs-2 and 10.

In addition to the above, borrow areas need to be finalized. It will be necessary to complete an inventory of any new borrow areas for Rafferty during the 1987 field season. In addition, those resources recorded during this inventory will need to be assessed and mitigated in the same year.

.2 Operation

As described for the construction stage, new or additional site inventories are required for both reservoirs along with increased levels of site assessment.

The design of a reservoir mitigation program must be based on 1) an understanding of reservoir impacts, and 2) a project specific research design. In regards to the former, Lenihan **et al.** (1981a) suggest that reservoir mitigations be directed by the range of impacts found in specific reservoir

zones. Based on their model, the mitigation options to be considered for each reservoir zone are as follows:

Permanent Conservation Pool

i) attempts should be made to predict biochemical impacts so that materials susceptible to attack can be salvaged

ii) the problem of long-term loss of access to site data must be addressed

Shoreline Fluctuation Zone

i) in most cases resource investigation is the only viable mitigation response

Maximum Flood Pool Zone

i) site stabilization is a viable option in this zone

Backshore Zone

i) site stabilization is a viable option in this zone

Downstream Zone

i) no options were identified as the range of impacts is unclear.

3.4 Residual Impacts

.1 Construction

The residual impact related to construction will be the loss of low significance heritage resources. Since few resources are ever completely studied, there will be the loss of unmitigated portions of significant sites.

.2 Operation

During the operation of the reservoir there will be three residual impacts. The first residual impact will be the loss or damage to low significance sites, and to unmitigated portions of significant sites located in the shoreline fluctuation zone. The second residual impact will be the chemical and biological alteration of low significance sites and unmitigated portions of significant sites. The third residual impact will be the loss of access to fully and partially inundated sites. Even heritage resources located in areas subjected to periodic inundation will suffer some loss of access.

3.5 Monitoring Strategy

In order to effectively monitor the effects of the related developments it will be necessary to improve the quality of the baseline information.

To facilitate future monitoring, it is necessary to be able to find the sites. The National Reservoir Inundation Study suggests several ways of accomplishing this including establishing permanent datums above Full Supply Level such that site locations can be determined by triangulation (Lenihan **et al.** 1981b).

A reservoir monitoring program should be concerned with mechanical, biochemical, and residual impacts. Where losses beyond those forecasted occur, some additional mitigation may be desirable. The intensity of monitoring should be directly related to the intensity of impacts.

Sites in the shoreline fluctuation zone will require the most intensive monitoring, particularly in the first several seasons of operation. Sites at the first year reservoir levels could be monitored as part of the program of inundation impact mitigation. Other affected sites should be visited, during drawdowns, in the first few years following full reservoir inundation. As well as noting site conditions, samples of individual resource constitutents could be investigated to determine how they are being altered by the various mechanical and biochemical effects.

In addition to the above, some monitoring of upstream and downstream effects is necessary. This could be effectively carried out at the same time the shoreline erosion is being monitored.

Furthermore, it would be desirable to monitor sites in the upper flood pool of both reservoirs. However, given the low estimated flood frequency, this may not be possible. If areas located within the upper flood pool are inundated, then a sample of sites within the affected area should be checked.

It may be desirable to monitor the effects of inundation within the permanent conservation pool. Because impacts here occur at a much slower rate, a longer term, less intense monitoring program would be desirable. Here, the primary emphasis would be in determining the effects on individual site constituents.

For both reservoirs, monitoring of vandalism to heritage resources located outside of the reservoir should be considered. This, in part, could be carried out by using the services of the regional advisors of the Saskatchewan Archaeological Society.

With the exception of wave-induced erosion, monitoring the reservoir effects would be a long-term activity which would be carried out at fairly low intensity.

3.6 Summary

The main effects of the proposed developments can be summarized as follows:

a) destruction of heritage resources located in the dam site, construction zone, and in areas utilized for borrow;

b) partial to complete loss of the regional resource base in both the Rafferty and Alameda Reservoirs;

c) partial to severe degradation or resources located within the reservoir shoreline zones;

d) potential preservation or slow degradation of resources located within the permanent conservation pools;

e) permanent loss of access to sites located in the permanent conservation pool; and

f) increased resource loss due to vandalism and increased visitation in areas adjacent to the reservoir.

It is the view of the SRC that, by more fully documenting the heritage resource base, and with a properly funded, properly designed mitigation program and a long-term monitoring program, the overall effect of these impacts can be diminished with the change in the Rafferty dam site, fewer resources will be inundated. Of those identified, only a small percentage are rated by SRC as being of high significance and there is a good confidence level that these resources can be assessed fully prior to inundation. Such studies of the heritage resources in these areas would lead to a substantial benefit in terms of scientific knowledge. Equally important, by looking at the educational and recreational benefits of specific heritage resources, considerable public benefit could be realized.

4 IMPACT MANAGEMENT PROGRAM

It is the intent of the Authority to fully implement the recommendations of the Saskatchewan Research Council. Based on the available level of baseline data and the available information on reservoir and construction impacts, a number of recommendations for mitigating these impacts have been formulated. In terms of specific impacts, where dates are given, these are based on the proposed 1988 construction start.

The first recommendation is that all additional work should be carried out within the boundaries of a comprehensive research design. Such a research design is necessary both to provide a framework within which more informed management decisions can be made, and to insure that the archaeological investigations that are carried out can provide answers to questions that are germane to both the Study Area and the discipline as a whole. Therefore, it is recommended that, an overall project research design should be prepared prior to the 1987 field season.

4.1 Recommendations Concerning the Rafferty Reservoir Development

Construction on the Rafferty Dam and Reservoir is proposed to begin in the spring of 1988. Given this date, the immediate concerns for the Rafferty Reservoir are to complete the baseline inventory and to increase the level of assessment to, at least, the 1986 standards.

There are already two significant resources that require some investigation beyond the assessment level (the Ratigan Tipi Ring site [DhMs-10] and the Sanderson Kill [DhMs-12]). As this number is expected to increase, some site excavation will have to proceed at the same time as site inventory and assessment. These recommendations apply to the Rafferty Dam and Reservoir project:

a) The construction of the line "C" dam, spillway channels and diversion channel route must be preceeded by an inventory and additional assessment study. If required, any significant heritage resources should be investigated beyond the assessment level.

b) Any ancillary developments, currently unknown, that have the potential to effect heritage resources will require inventory and assessment studies.

c) The baseline inventory of the Rafferty Reservoir should be completed during the 1987 field season, at least to an elevation of 550.5 m. The remainder of the reservoir, to the maximum flood control level of 553 m, could be surveyed during the 1988 field season.

d) The level of assessment for all reservoir resources should be increased to the 1986 study standards. This could be completed over the summers of 1987 and 1988. During the 1987 field season, the emphasis will be on completing the assessments of those resources located at an elevation of 550.5 m or lower.

e) Significant resources that will be inundated should receive additional investigation. The level of investigation will be dependent on both the level of significance, the severity of the impact, and the overall goals of the project research design.

f) Some attempt could be made to develop the public potential of the Rafferty resources. This could take several avenues including interpreting any heritage resources with a relocated Dr. Mainprize Park, developing an interpretive center at the dam site or in the city of Estevan, incorporating some heritage resources into self-guided tours through the upper end of the reservoir, or popularizing the results of the archaeological investigations.

g) A long-term, low-level monitoring strategy should be developed for assessing the reservoir impacts on the heritage resources. This plan should be developed as the baseline information is developed.

4.2 Recommendations Concerning the Alameda Reservoir Development

For Alameda, the same basic recommendations apply although the time table for completion is different. Construction of the Alameda Dam and Reservoir is not scheduled to begin until 1989. These recommendations apply to the Alameda Reservoir:

a) The two dam site resources should be assessed and, if warranted, investigated beyond the assessment level. This should be completed prior to the proposed start of construction date.

b) All borrow pits or other ancillary developments required for the Alameda dam should be inventoried, and the resources in them should be assessed prior to the proposed start of construction.

c) The inventory of the heritage resources located within the reservoir should be completed. This should be initiated at least one year prior to the proposed start of construction.

d) It will be necessary to assess the Alameda resources to the same level as the Rafferty Reservoir resources. This assessment should be started prior to the proposed start of construction.

e) Significant resources that will be adversely affected by either reservoir or construction processes should receive additional investigation. The level of investigation will be dependent on both the level of significance, the severity of the impact, and the overall goals of the project research design.

f) There could be some attempt to develop the public potential of these heritage resources. As this is being developed as a recreational reservoir, an attempt should be made to interpret resources within recreational settings such as a heritage park or small museums.

g) It will be necessary to develop a comprehensive, long-term, low-level monitoring program. The development of this plan should proceed with the development of the heritage resources data base.

4.3 Archaeological Impact Management Program

The Archaeological Resource Management Section (ARMS), Heritage Resources Branch, Saskatchewan Parks, Recreation and Culture has assisted the Souris Basin Development Authority in preparing required Terms of Reference for an Archaeological Impact Management Program which effectively responds to the recommendations presented above. The objectives will be to: 1) identify the majority of archaeological and historic resources in the Project Area; 2) to assess a representative sample of those resources; and 3) to mitigate impacts to a representative sample of resources demonstrated by the assessment program to be of importance to the understanding and appreciation of the prehistory and history of southeastern Saskatchewan.

The Authority undertakes to ensure that the Impact Management Program will be carried out in accordance with current standards of archaeological/historical research and resource management such that substantive gains to knowledge in these fields is achieved. The Program will be undertaken in accordance with a project research design prepared in consultation with ARMS. Details of the approved Program appear in Appendix F. The Authority has allocated $1.3 Million for the archaeological program for the Rafferty/Alameda Project.

GLOSSARY

Aspen Grove Ecodistrict: a vegetation zone characterized by a mosaic of grassland and forest vegetation, primarily trembling aspen.

Assiniboin Indians: an Indian group, closely related to the Sioux, who, before the early 1800s, lived on the northern plains from Manitoba to Alberta.

Auger Testing: a survey technique using a portable drill to test the soil for buried sites.

Avocational Archaeologist: a person who practices archaeology as a special interest rather than a full-time occupation.

Avonlea Complex: (1750 to 1150 B.P.) a plains/parkland group who were the first to rely heavily on the bow and arrow. This group is characterized by fine lithic craftsmanship and coconut-shaped pottery vessels with a net-impressed surface finish.

Besant Complex: (2000 to 1150 B.P.) a plains/parkland group characterized by a reliance on bison and the introduction of pottery into Saskatchewan.

Borden Designation: a combination of four letters (e.g. DgMr) and a number used to designate archaeological sites in Canada. The letters refer to a grid segment defined by longitude and latitude, the number refers to a specific site within that segment.

B.P.: a chronology based on the number of years Before Present, specifically meaning before 1950.

Clovis Complex: (11,350 to 10,500 B.P.) the oldest recognized cultural group occupying non-glaciated North America. This group is characterized by large lanceolate-shaped spear points used to hunt extinct Pleistocene fauna.

Cody Complex: (9500 to 8650 B.P.) a Paleo-Indian bison-hunting group that are characterized by a distinctive knife style.

Cutbank Inspection: a technique for locating buried sites by examining exposures created by river erosion or man-made disturbances like roads.

Duncan Point: (4150 to 3100 B.P.) one of the projectile point styles associated with the McKean Complex.

Folsom Complex: (11,000 to 10,000 B.P.) the first of the plains bison-hunting groups which are characterized by the use of long, lanceolate spear points with a groove (flute) running down the midline.

Hidatsa Indians: an Indian group, distantly related to the Sioux, who, in the late 1700s, were based in horticultural villages on the Missouri River.

Lanceolate Points: long, slender, leaf-shaped points characteristic of the earliest complexes - see Clovis and Folsom.

Lithic Scatter: a type of archaeological site which is characterized by a cluster of stone debris left from a previous occupation and now exposed on the surface.

Logan Creek Complex: an early side-notched projectile point component that dates to the same time period as Mummy Cave. The relationship between the two complexes has not been fully determined at this time.

McKean Complex: (4150 to 3100 B.P.) a plains bison-hunting group that are characterized by three related projectile points - McKean, Duncan, and Hanna.

Middle Missouri Region: the segment of the Missouri River between the Little Missouri and the White River Rivers. This area was inhabited by plains Indian groups that practiced horticulture and who may have made seasonal trips into the Souris area.

Mixed-Grass Prairie Ecodistrict: is characterized by a variety of grasses including spear grasses, wheat grasses and June grass.

Mound Building Tradition: a number of prehistoric cultures that are characterized by the construction of various sized earth mounds. These mounds are common in southwestern Manitoba but are rarely found in southeastern Saskatchewan.

Mummy Cave Complex: (7700 to 4750 B.P.) marks the replacement of lanceolate spear points by smaller side-notched projectile points that were probably used with a spear-thrower.

Old Women's Phase: (800 to 200 B.P.) a late prehistoric bison-hunting group, characterized by the use of side-notched arrow points, found in the grasslands of Alberta and southwestern Saskatchewan.

Oxbow Complex: (4700 to 3050 B.P.) named after the Oxbow Dam site in southeastern Saskatchewan. This bison-hunting group is characterized by the use of distinctively shaped spear points.

Paleosol: an old (paleo=old) soil, now buried, that represents a past land surface.

Paleo-Indian: the first big game hunters in Saskatchewan - see Clovis and Folsom.

Pelican Lake Complex: (3000 to 2000 B.P.) a prehistoric bison-hunting group who used the first corner-notched points.

Plains Village Indians: the horticultural Indian groups who lived in the middle Missouri region.

Projectile Point: this term is used to refer to both spear points and arrow points.

Provincial Site Inventory: a list of all of the archaeological sites located in Saskatchewan which is kept by the Archaeological Resource Management Section of Saskatchewan Parks, Recreation and Culture.

Resource, Heritage: a product of nature or man that is of interest for its architectural, historical, cultural, aesthetic or scientific value.

Resource, Historic: a resource which dates to the time period when Euro-Canadians were in the region.

Resource, Prehistoric: a resource which predates the time period when Euro-Canadians were in the region.

Sherd: a fragment of pottery.

Site: a physical location with detectable evidence of past human activity. The term is usually used with a descriptive qualifier - see also "resource".

Site, Buried: a site that is underneath the present land surface.

Site, Historic: a site that dates to the time period when Euro-Canadians were present in the region.

Site, Multicomponent: a site that was occupied on more than one occasion.

Site, Petroform: a site which contains an aboriginal rock construction which is not a stone circle nor a cairn.

Site, Stone Cairn: a site that contains a rock pile usually constructed by Indian groups which sometimes, but not always, indicates a grave.

Site, Stone Circle: a site that contains tipi rings, created when rocks were used to weigh down the edge of hide tipis.

Site, Vision Quest: a site which contains a small, circular stone wall found at elevated locations with a good view of the surrounding countryside. These were used as locations to obtain visions.

Sonota Complex: (2000 to 1350 B.P.) a plains bison-hunting culture who made burial mounds. This complex is related to Besant and is characterized by the extensive use of a translucent brown stone known as Knife River flint.

Surficial: found on the surface.

Survey: refers to finding archaeological sites. (This term is synonymous with inventory.)

Survey, Judgemental: selecting the location of areas to be surveyed on the basis of the archaeologist's experience.

Survey, Land Operator: the initial gathering of data using knowledge gained from local people, usually farmers, familiar with a specific area.

Survey, Probabilistic: selecting the location of areas to be surveyed using a random sampling scheme.

Temporally Diagnostic: refers to types or styles of artifacts that are known to have changed over time. When their age is known from elsewhere, they can be used to determine the approximate age of a site.

APPENDICES

APPENDIX A

SITE SIGNIFICANCE EVALUATION CATEGORIES

A.1 INTRODUCTION

This appendix is taken, with minor editing, directly from a report by Burley (1982). The following sections outline the evaluative categories for both scientific and public significance.

A.2 SCIENTIFIC SIGNIFICANCE

Scientific significance involves the potential use of resources to establish facts about the past (Moratto and Kelly 1978:5). It is also recognized that many resources may make a contribution to disciplines other than anthropology/archaeology and that some could possibly serve as testing grounds for theoretical or methodological innovation (Schiffer and House 1977; Whitlam 1981).

This significance scheme is based on a general research design that is basic to regional studies. Four basic problem domains have been identified: culture history, subsistence strategy/technological adaptation, settlement pattern and group lifeways. To accommodate the extra-disciplinary and methodologial/theoretical significance of a resource, a scientific advancement/experimental significance subset was added. Each of these subsets is briefly reviewed as to their inclusive traits and measurable criteria.

A.2.1 Culture Historical Significance

In its strictest sense, culture history may be defined as the study of past cultures or peoples through their material culture remains over time. The primary focus centers on the delineation of stylistic and/or technological elements which, subsequently, are used to identify a homogeneous archaeological complex or phase from other complexes or phases.

A series of questions have been posed to guide data collection and research (Burley and Meyer 1981:4-11) which focus on 1) a delineation of the stylistic, technological and morphological characteristics of each culture historical period, 2) a determination of the spatial configuration and temporal range for each, 3) an elucidation of the culture historical relationship of each for preceding, co-existent and subsequent complexes and, 4) an interpretation of the culture historical relationships of regional complexes with those in adjacent areas. These questions and the data necessary for their solution have been used to identify four measureable criteria for the assessment of culture historical significance. These criteria include:

a) site potential for its placement into a culture historical framework - this is determined on the basis of recognized diagnostic materials within site collections or the presence of associated materials that could be used for a radiocarbon assay.

b) site potential for homogeneous occupation study - this specifically refers to the temporal integrity of the resource. Such integrity (i.e. single component, stratigraphically or spatially segregated components) is essential for the definition of associated stylistic, technological or morphological elements of each culture historical period.

c) site culture historical uniqueness - this criterion measures the culture historical redundancy of a resource within the known data base. A resource with only a small number of co-occurring temporal associations (i.e. Paleo-Indian, Early Side-Notch) would be given a high value.

d) site potential for the solution of culture historical problems - although every dated component, to some extent, may contribute to a solution of research design questions, those resources which have the potential to address several problems or a unique problem within the overall research design (see Burley and Meyer 1981; Burley 1981) would be given a high rating.

A.2.2 Subsistence Strategy/Technological Adaptation Significances

Data relevant to an understanding of individual adaptations were considered to be a high research priority.

These data could relate either to subsistence stategies or technological industries. Within the research design, a series of questions for each culture historical period was drawn up. Among these were 1) a determination of subsistence resources being procured, 2) a determination of the technological elements of subsistence, 3) a study of the interrelationships of subsistences stategies and adaptations over time and 4) a study of other elements of technological adaptation. Again, research design questions and the data necessary for their solution were used to frame individual significance criteria. These are:

a) site potential for homogeneous occupation study - this criterion is identical to that within culture historical significance. Without temporal integrity, it would be impossible to accurately determine intra-complex subsistence and/or technological patterns.

b) site potential for the study of subsistence resources - this criterion evaluates a site assemblage for the identification of procured subsistence remains. Sites with preservation of faunal, floral or other data leading toward such an identification would be rated high.

c) site potential for the study of technological adaptation through material remains - measurement of this criterion is based on the presence or absence of specific artifact types through which technological industries can be interpreted. These industries would include subsistence technology, individual lithic technologies, woodworking technologies, etc.

d) site potential for the study of subsistence/technological adaptation through site specific features - similar to the preceding, measurement is based on the presence or absence of site features which might lead to a greater understanding of technological adaptation. These would include functionally spe-

cific activity areas, homogeneous midden concentrations and/or other such features.

A.2.3 Settlement Pattern Significance

Employing Chang's (1968:3) definition of settlement pattern, this concept refers to "...the physical locale or cluster of locales where the members of a community lived, insured their subsistence and pursued their social functions in a delineable time period." Within the research design, settlement pattern is to be addressed on three levels - individual occupation units, intra-site occupation arrangements and inter-site spatial configurations. For the various archaeological complexes, several problems and the requisite data types necessary to answer them have been defined. These questions vary from the determination of occupation floor interior relationships and group size to broad scale change in study area geographic land uses. To assess settlement pattern significances at each resource, the following criteria have been abstracted:

a) site potential for homogeneous occupation study - again temporal integrity is viewed as a requisite for settlement pattern study. However, on the level of intra-regional settlement pattern, the presence of a dated component, even in a mixed context, provides at least some data for interpretation.

b) site potential for the study of individual occupation floors - this criterion is based upon the presence or absence of an occupation floor as inferred from feature and/or artifact spatial arrangements. An occupation floor might include the identified interior of a habitation structure or an association of spatially isolated features and artifact concentrations.

c) site potential for the study of intra-site community arrangements - interrelated with the preceding, this criterion measures the potential each resource has to delineate intra-site spatial relationships. It would normally be determined on the basis

of site features, size and internal complexity.

d) site potential for the study of intra-regional settlement pattern - as has been noted, even those resources including mixed assemblages have some potential to address this objective. This criterion, as determined through artifacts, faunal remains, features or geographic locale, measures a site's potential to discern land use practices within each culture historical period.

A.2.4 Group Lifeway Significances

This aspect of scientific significance is perhaps the most difficult to define and measure given the nature of archaeological data. Even so, if a resource is perceived to have some potential to bear on this problem domain, then its recognition within the significance evaluation insures its consideration within the mitigation design. The concept of group lifeways includes questions of intra- and inter-regional exchange, social networks, belief systems and conflict. To measure this significance, the following criteria have been used:

a) site potential for homogeneous occupation study - temporal integrity is again considered to be an important element.

b) site potential for the study of intra- and/or inter-group exchange - measurement of this potential is based upon the documentation of intra-regional localized items and/or imported exotic goods. While the former are difficult to discern, the latter is a recognizable element in resource collections.

c) site potential for a study of intra- and/or inter-group social networks - this criterion measures a resources ability to bear upon questions of group conflict, inter-marriage, seasonal aggregation for social functions, etc. Data needed to address these questions are difficult to define although the presence of certain types of artifacts or features (ceramics, osteological remains, ritualistic items) could lead toward an interpretation of social relations.

d) site potential for a study of intra- and/or inter-group belief systems - the measurement of this criterion is fraught with problems similar to those above. Again certain forms of data are considered to have at least some potential for interpretation (burials, artistic objects, etc.).

A.2.5 Scientific Advancement/Experimental Significances

This significance category recognizes the potential of a resource to contribute to scientific advancement in other disciplines (after Dixon 1977) as well as theoretical or methodological issues in archaeology or anthropology. Four criteria are defined:

a) site potential for methodological advancement in data collection techniques - this subset measures the experimental potential of a resource to contribute to data collection methodologies. These could include experiments in plowing, sampling, flotation, excavation techniques and the like.

b) site potential for methodological advancement in analytical studies - similar to the above, the emphasis is placed on experimental potential for analyses. This might consist of possible refinements in taxonomic studies, use-wear analysis, various mechanical analyses (i.e. soils, ceramics), spatial analyses, etc.

c) site potential for theoretical advancement in anthropology/archaeology - this criterion measures the potential of a resource to address larger theoretical concerns in the fields of anthropology or archaeology. These concerns will undoubtedly vary although such topics as hunter-gatherer territoriality, socio-economic evolution and complexity or principles of culture change provide general examples.

d) site potential for advancement in other disciplines - it is recognized within this criterion that archaeological resources could have a potential to advance knowledge in other Quaternary sciences. Measurement is based upon the presence or absence of data pertinent to the study of paleo environments, species biography, vegetation, climatic events, geological processes, hazards research, radiometric dating, medicine or similar such research interests.

A.3 PUBLIC SIGNIFICANCES

The term public significance is here used to incorporate the humanistic and symbolic values of a resource and its potential to add to those values through interpretation, display or reconstruction. Three significance subsets have been defined. These include historic/ethnic significances, on-site interpretation significance, and display significance. Each is briefly reviewed and their inclusive traits are defined.

A.3.1 Historic/Ethnic Significances

Historic and ethnic significances are here defined as the recognized or unrecognized symbolic value that a resource may hold for a nation, province, community, culture or ethnic group. Three criteria have been established:

a) the resource has a potential to add to the native and/or local communities' sense of culture - this is a highly judgemental factor although it is anticipated that sites having potential data to address past lifeway interpretations, technology, etc. could add to the community's appreciation of their cultural heritage.

b) the resource has a potential to add to the native and/or local communities' sense of place or time - those resources which could potentially have a symbolic value to further a sense of local time depth or place would be given a high rating. Although this may discriminate against recent prehistoric sites, large aggregation sites could potentially be recognized as having a high contribution to a sense of place.

c) the resource has a symbolic potential to add to a sense of heritage beyond the local community - highly rated resources would be those which add to a heritage recognition by virtue of their importance vis a vis other heritage resources outside of the study area.

A.3.2 On-site Interpretation Significance

This type of significance relates to the possible educational and/or recreational experience that the public might gain through an on-site interpretation of an archaeological excavation and its evolving results. This type of significance also includes the potential a resource might have to contribute to an awareness of archaeological field methodologies and principals. To evaluate resource potential, three criteria have been defined:

a) the potential a resource has for unrestricted access - obviously those resources without acceptable road accesses would be unsuitable for on-site interpretation.

b) the potential a resource may have for on-site resource interpretation about the past - this would measure the interpretive elements of a resource's assemblage content and features for the explanation of past lifeways.

c) the potential a resource has for the explanation of archaeological methodologies and principals - this factor is a measure of an archaeological site's perceived potential for the explanation of field methodologies including excavation, data recording, conservation and other techniques.

A.3.3 Display Significance

It is recognized that many resources could add to the public's sense of heritage through museum display interpretation or off-site reconstruction. Display significance, therefore, measures the perceived value of resource data for such treatments. Again three criteria have been defined. These include:

a) resource potential for assemblage display - this would be measured through the quality and quantity of display worthy items included within a site collection.

b) resource potential to provide data necessary for an interpretive reconstruction - highly rated resources would be those having site-specific features which could lead to either a replication or interpretive reconstruction of the resource either within a museum exhibit or through a living museum concept.

c) resource potential for the interpretation of site activities and lifeways - such a criterion reviews resource data for the possibility of site-specific interpretations which could enhance either the display of artifacts or an interpretive reconstruction.

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APPENDIX B

SUMMARY OF SITE ASSESSMENT DATA

FOR RESOURCES RECORDED IN 1984

Appendix B.1 Site Assessment Data for the Dam Site/Spillway Resources.

Site No.	No. Tests	fcr		Lithic Deb.		Lithic Tools		Bone		Ceramics	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
DgMs-31	2	--	--	--	--	1	3	--	--	--	--
-32	2	--	--	8	11	1	0	1	0	--	--
-36	2	--	--	2	75	--	--	1	0	--	--
DhMs-3	6	--	--	5	4	--	--	--	--	--	--
-4	2	--	--	6	22	--	--	--	--	--	--
-6	4	--	--	3	1	--	--	--	--	--	--
-7	10	--	--	7	130	2	2	--	--	--	--
-10	14	2	21	69	475	3	3	158	166	7	7

Appendix B.2 Site Assessment Data for the 1984 Canal Route Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone	
		No.	Wt.	No.	Wt.	No.	Wt.
DgMt-1	2	1	1	--	--	--	--
-2	2	1	1	--	--	--	--
DhMs-1	8	9	2	--	--	--	--
-2	2	5	4	--	--	28	23
DhMt-11	2	3	3	--	--	--	--
-12	2	3	2	1	0	9	3

Appendix B.3 Site Assessment Data for the Judgemental Area I Resources.

Site No.	No. Tests	fcr		Lithic Deb.		Lithic Tools		Bone		Shell		Ceramics	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
DiMv-16	--	--	--	4	115	--	--	3	2	--	--	--	--
-32	2	--	--	4	2	--	--	44	23	--	--	--	--
-33	2	--	--	--	--	--	--	13	3	--	--	--	--
-34	3	--	--	2	2	1	1	29	20	--	--	2	7
-36	3	--	--	2	3	--	--	1	0	--	--	--	--
-37	2	--	--	11	17	4	9	52	10	--	--	--	--
-38	43	3	6	12	8	2	6	853	844	8	0	2	1
-39	16	--	--	1	1	--	--	90	108	--	--	--	--
-42	9	--	--	--	--	--	--	44	41	--	--	3	2
-43	3	--	--	--	--	--	--	1	0	--	--	--	--

Appendix B.4 Site Assessment Data for the Judgemental Area 2 Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone	
		No.	Wt.	No.	Wt.	No.	Wt.
DiMv-6	2	2	105	--	--	--	--
-8	2	--	--	1	1	--	--
-12	2	4	15	--	--	2	2
-13	7	4	5	--	--	--	--
-14	1	--	--	--	--	3	1
-15	3	2	1	1	170	2	44

Appendix B.5 Site Assessment Data for the Judgemental Area 3 Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone		Ceramics	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
DhMt-23	--	--	--	1	48	--	--	--	--
-25	2	5	3	--	--	9	4	--	--
-29	2	1	0	--	--	--	--	--	--
-35	2	19	19	--	--	32	26	--	--
-36	2	2	1	1	1	33	52	--	--
-43	2	--	--	--	--	2	2	2	3
DhMu-5	--	7	10	--	--	11	36	--	--
-6	2	2	179	--	--	1	0	--	--
-25	5	1	0	--	--	--	--	--	--
DiMv-51	2	--	--	--	--	--	--	36	23

Appendix B.6 Site Assessment Data for the Judgemental Area 4 Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone	
		No.	Wt.	No.	Wt.	No.	Wt.
DhMt-3	--	--	--	1	4	2	108
DhMt-5	2	--	--	--	--	2	2
-7	4	7	3	--	--	8	13
-10	8	10	63	--	--	--	--
-52	2	1	0	--	--	76	97
-57	4	2	21	1	3	5	24

Appendix B.7 Site Assessment Data for the Judgemental Area 5 Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone	
		No.	Wt.	No.	Wt.	No.	Wt.
DhMu-8	2	6	1	3	1	31	12
-11	2	1	1	--	--	21	25
-32	2	1	11	--	--	--	--
-34	2	2	0	--	--	--	--
-35	2	1	1	1	7	--	--

Appendix B.8 Site Assessment Data for the Judgemental Area 6 Resources.

Site No.	No. Tests	Lithic Deb.		Lithic Tools		Bone		Ceramics		Glass	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
DhMt-13	4	--	--	--	--	2	1	--	--	--	--
-14	1	--	--	--	--	3	3	--	--	--	--
-15	2	1	5	--	--	1	0	--	--	--	--
-17	2	--	--	--	--	1	69	--	--	--	--
-19	2	--	--	--	--	2	1	--	--	--	--
-20	2	2	6	1	10	4	2	--	--	--	--
-21	6	7	78	7	59	1	0	--	--	--	--
-26	2	--	--	--	--	19	14	--	--	--	--
-27	2	1	3	--	--	1	0	--	--	--	--
-30	2	--	--	1	70	--	--	--	--	--	--
-32	2	--	--	--	--	3	1	--	--	1	0
-38	2	2	4	--	--	2	2	--	--	--	--
-40	2	1	1	--	--	30	6	--	--	--	--
-42	2	1	1	--	--	--	--	--	--	--	--
DhMu-7	2	--	--	--	--	5	44	--	--	--	--
-9	2	--	--	--	--	8	4	--	--	--	--
-10	6	1	0	--	--	1	21	1	0	--	--
-12	2	1	1	1	0	3	0	--	--	--	--
-13	2	--	--	--	--	7	5	--	--	--	--
-14	2	--	--	--	--	2	1	--	--	--	--
-17	2	2	6	1	0	--	--	--	--	--	--
-18	2	4	8	--	--	31	28	--	--	--	--
-19	2	3	98	--	--	1	0	--	--	--	--
-20	6	--	--	--	--	--	--	--	--	--	--
-36	6	--	--	--	--	1	21	--	--	--	--
DhMv-1	2	3	3	--	--	--	--	--	--	--	--
-2	2	1	1	--	--	--	--	--	--	--	--
DiMv-50	1	1	0	--	--	--	--	--	--	--	--

Appendix B.9 Site Assessment Data for the Judgemental Area 7 Resources.

Site. No.	No. Tests	fcr		Lithic Deb.		Lithic Tools		Bone		Shell		Ceramics		Glass	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
DiMv-18	4	--	--	16	5	--	--	--	--	--	--	--	--	--	--
-20	2	--	--	1	2	--	--	--	--	--	--	--	--	--	--
-21	2	--	--	1	2	1	5	--	--	--	--	--	--	--	--
-22	2	--	--	12	8	--	--	--	--	--	--	--	--	--	--
-23	2	--	--	7	8	--	--	5	2	--	--	--	--	--	--
-25	1	--	--	1	13	--	--	--	--	--	--	--	--	--	--
-27	2	2	11	1	37	--	--	9	3	--	--	--	--	--	--
-52	2	--	--	--	--	--	--	1	0	--	--	--	--	--	--
-56	2	--	--	--	--	--	--	6	34	--	--	--	--	1	5
-61	13	2	6	2	1	7	338	103	53	1	0	12	41	--	--
-62	5	--	--	--	--	--	--	16	5	--	--	--	--	--	--
-65	1	--	--	--	--	--	--	96	76	--	--	--	--	--	--
-66	2	--	--	1	9	--	--	13	15	--	--	--	--	--	--

APPENDIX C

SUMMARY OF 1984 RECORDED RESOURCES BY PROJECT SUBAREA

Appendix C.1 Summary of the Dam Site/Spillway Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DgMs-30	5				?			2	1050
DgMs-31	7				1		1	1	5100
DgMs-32	6				1		2		150
DgMs-35	13	3	1		1		1	1	7700
DgMs-36	13	1			1		1	1	12600
DgMs-37	3				?			2	250
DgMs-38	7	?	7	?	?				627000
DhMs-3	37				1		4	2	36300
DhMs-4	7		1		1		2		5000
DhMs-5	4				?				9400
DhMs-6	22	1			1		2	2	48000
DhMs-7	62	2			1		5	5	64000
DhMs-9	3				?			2	900
DhMs-10	72	12	2		1+		14		126000
TOTAL	254	19	4	0	-	0	32	18	943450
MEAN	20	4	1	0	-	0	4	2	67390

Appendix C.2 Summary of the 1984 Canal Route Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	TESTS Unsuccessful Total	Square Area m^2
DhMt-11	2		1		1		1	1	600
DhMt-12	9		1	1	1		2		4500
DgMt-1	2				1		1	1	75
DgMt-2	7				1		1	1	17200
DhMs-1	45	17			1		3	5	93500
DhMs-2	3		1	1	1		2		825
TOTAL	68	17	3	2	-	0	9	8	116700
MEAN	11	17	1	1	-	0	2	2	19450

Appendix C.3 Summary of the Judgemental Area 1 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DiMv-16					1+				?
DiMv-28						3			13000
DiMv-29						3			2500
DiMv-30						3			2000
DiMv-31		1				1			?
DiMv-32	4				1		2		900
DiMv-33	3	1			1		1	1	4000
DiMv-34					1		3		8000
DiMv-35						5			8000
DiMv-36		2			2+		1	2	1000
DiMv-37					1+		2	?	11250
DiMv-38					1		37	6	4400
DiMv-39					1		8	8	1500
DiMv-40		1						1	N/A
DiMv-41	2				?			1	100
DiMv-42					1		3	6	200
DiMv-43		1			1		1	2	1000
DiMv-44	1				?			2	N/A
DiMv-45	3	1			?			2	7200
DiMv-46	10	1			?			2	20400
DiMv-69	?				?				151250
TOTAL	23	8	0	0	-	15	58	33	236700
MEAN	4	1	0	0	-	3	6	3	13911

Appendix C.4 Summary of the Judgemental Area 2 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DiMv-6	8				1		1	1	21000
DiMv-7	15				?			2	9750
DiMv-8	14				1		1	1	13600
DiMv-9	2				?			2	700
DiMv-10	4				?			2	600
DiMv-11	2				?			2	600
DiMv-12	3				1		2		1500
DiMv-13	29	2			1		2	5	45900
DiMv-14		1			1		1		N/A
DiMv-15	1	1			1		1	2	1000
DhMu-3	34	1						6	31500
TOTAL	112	5	0	0	-	0	8	17	126150
MEAN	11	1	0	0	-	0	1	2	12615

Appendix C.5 Summary of the Judgemental Area 3 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	TESTS Unsuccessful Total	Square Area m^2
DhMt-16	2				?			2	150
DhMt-22					1?				3150
DhMt-23					?				5400
DhMt-25	2			1	1		1	1	300
DhMt-28						7			9240
DhMt-29	1				1		1	1	N/A
DhMt-34						2			900
DhMt-35	2				1		2		75
DhMt-36	5				1		2		2925
DhMt-37						2			?
DhMt-43							2		?
DhMt-56	15	3			?			2	33075
DhMt-58	3				?			2	1500
DiMv-47		1			?				N/A
DiMv-48	12				?			2	14400
DiMv-49	8	1			?				6600
DiMv-51	3				1		1	1	375
DiMv-53	1				?			2	N/A
DgMs-33	4				?			1	3200
DgMs-34	13				1				20000
DhMu-4	6	1			?			2	3750
DhMu-5					1				?
DhMu-6	14	1			1		1	1	8700
DhMu-24		17			?				5000
DhMu-25	17				1		1	4	26000
DhMu-37					?				1800
DhMu-38					?				1400
TOTAL	108	24	0	1	-	11	11	21	147940
MEAN	7	4	0	1	-	4	1	2	7045

Appendix C.6 Summary of the Judgemental Area 4 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DhMt-1	8				?			2	6650
DhMt-2	1				?			2	N/A
DhMt-3					2				N/A
DhMt-4	1				?			2	N/A
DhMt-5	1				1		1	1	N/A
DhMt-6	1				1			2	N/A
DhMt-7	14	1			1		4		26000
DhMt-8						4			1900
DhMt-9	2				?	1		2	200
DhMt-10	55	3	2		1		5	3	73500
DhMt-52	12				1		2		4375
DhMt-57	28				1		2	2	49000
DhMs-8						1			
TOTAL	123	4	2	0	-	6	14	16	161625
MEAN	12	2	2	0	-	2	3	2	23089

Appendix C.7 Summary of the Judgemental Area 5 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DhMt-24						2			1800
DhMu-8	5				1		2		900
DhMu-11	1				1		2		1400
DhMu-32	7				1		1	1	18000
DhMu-33						9			13300
DhMu-34	3	1			1		1	1	4000
DhMu-35	3				1		1	1	5200
TOTAL	19	1	0	0	-	11	7	3	44600
MEAN	4	1	0	0	-	6	1	1	6371

Appendix C.8 Summary of the Judgemental Area 6 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DhMt-13	16				1		1	3	38000
DhMt-14	6	1			1		1		5250
DhMt-15	2				1		1	1	350
DhMt-17	2				1		1	1	300
DhMt-18	6	1			?				2800
DhMt-19	4	2			1		1	1	2100
DhMt-20					?		2		12000
DhMt-21					1		5	1	8000
DhMt-26	7				1		2		8000
DhMt-27				1	1		1	1	2500
DhMt-30	12	1			1			2	28975
DhMt-31	11				?			2	4000
DhMt-32	3			1	1		2		350
DhMt-33						6			5850
DhMt-38	2				1		2		100
DhMt-39	4		1		?			2	2200
DhMt-40	1				1		2		N/A
DhMt-41						3			1575
DhMt-42	6				1	1	1	1	9075
DhMt-44	2				1		1	1	250
DhMt-45	2	1			?			2	400
DhMt-46						7			35750
DhMt-47						5			1900
DhMt-48						1			N/A
DhMt-49						1			N/A
DhMt-50	3				?			1	225
DhMt-51						3			1350
DhMt-53	8				?			2	4750
DhMt-54	15				?			2	12825
DhMt-55	1	1			?			2	50

Appendix C.8 (Continued)

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	Unsuccessful Total	Square Area m^2
DlMv-26	1				?				N/A
DhMv-1	3		1		1		1	1	5525
DhMv-2	5				1		1	1	1000
DhMu-7	3		1		1		1	1	2500
DhMu-9	1				1		1	1	N/A
DhMu-10	33	2			1		2	4	19800
DhMu-12	2				1		2		525
DhMu-13	5			1	1		1	1	625
DhMu-14	13				1		1	1	17325
DhMu-15	14			1	?			2	9900
DhMu-16	9				?			2	16400
DhMu-17	4	3	1		1		1	1	11900
DhMu-18	2				1		2		50
DhMu-19	1				1		2		N/A
DhMu-20	37	1			1		3	3	135700
DhMu-21	1				?			2	N/A
DhMu-22	2	1			?			2	375
DhMu-23	2				?			2	300
DhMu-26						1			16
DhMu-27						2			1000
DhMu-28	2				?			2	200
DhMu-29	4				?				9975
DhMu-30	2				?			2	125
DhMu-31	7				?			2	6000
DhMu-36	33	1			1		1	5	72000
DlMv-50	15				1		1		11500
TOTAL	314	15	4	4	-	30	43	60	511666
MEAN	7	1	1	1	-	3	2	2	10442

Appendix C.9 Summary of the Judgemental Area 7 Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	TESTS Successful Total	TESTS Unsuccessful Total	Square Area m^2
DiMv-17	7	1	1		?			3	29400
DiMv-18	13	2			1		3	1	10800
DiMv-19	4				?			2	1500
DiMv-20	5				1		1	1	1200
DiMv-21	2				1		2		300
DiMv-22	2				1		1	1	125
DiMv-23	2				1		2		75
DiMv-24	1	10			?			1	8500
DiMv-25	8				1		1		7200
DiMv-27	9				1		2		7500
DiMv-52	1	1			1		1	1	N/A
DiMv-54		1			?				N/A
DiMv-55		1			?				N/A
DiMv-56				1	1		2		150
DiMv-57					1+				?
DiMv-58						2			350
DiMv-59					?				32500
DiMv-60					?				2250
DiMv-61				1	2+		12	1	50000
DiMv-62					3+		4	1	?
DiMv-63				1	3+	1			?
DiMv-64					1				?
DiMv-65		1		4	3		1		?
DiMv-66	3				1		2		1400
DiMv-67	3	2			?			2	5400
DiMv-68	2	3	1		?				600
TOTAL	62	22	2	7	-	3	34	14	159250
MEAN	4	2	1	2	-	2	3	1	8847

Appendix C.10 Summary of 555 m Reservoir Resources.

Site	No. of Rings	No. of Cairns	No. of Stone Features	Other Features	No. of Stratum	No. of Historic Features	Tests Successful Total	Tests Unsuccessful Total	Square Area m^2
DjMw-22					2				?
DjMw-23					2				?
DjMw-24		1			1				7500
DjMw-25					1				19200
DjMw-26	200+	8+			?				?
DjMw-27					2				?
DjMw-28					2				?

APPENDIX D

RESEARCH POTENTIAL OF THE DIFFERENT SITE TYPES RECORDED DURING THE 1984 INVENTORY STUDY

D.1 INTRODUCTION

Each of the site types recorded during the Rafferty, Shand, and Alameda field surveys have some unique elements, and varying degrees of research potential. This Appendix presents a preliminary analysis of the site data obtained in 1984 and discusses the potential of this data for solving research questions at both a regional and an extra-regional level. The results of the 1986 fieldwork, when analysed, will be reported in a later publication.

D.2 RESEARCH POTENTIAL

D.2.1 Homestead Era Resources

The historical resources identified during the 1984 study date to between 1903 and 1920. With the exception of the Shand site and the CPR Water Pumping Station, most of the historic resources are related to homesteading and agriculture within the study area. More comprehensive study would be required to determine the age of many of the structural remains and the history of individual farmsteads.

Table D.1 lists the historic sites that were recorded during the 1984 study and compares them with information gleaned from the homestead records. It will be noted that there are approximately twice as many archaeological features as there are structures listed on the patent applications. The largest discrepancy is in the number of cellars. However, many of the cellars may have only been used for storage (i.e. a root cellar) and would not have been inventoried for the homestead application. Taking this factor into account, the fit between the two sets of records is surprisingly close, given that it is a reasonable assumption that additional structures would have been added over the

Table D.1 Historic Resources with Associated Homestead Records.

Site No.	Recorded Features Cellars	Foundations	Improvements On Patent Application	Date Of Entry
DhMt-8	1	2	12x14' house, 32x34' stable	1906
DhMt-9	1	0	same quarter section as above	
DhMt-24	1	1	24x28' house, stable	1907
DhMt-28	4	1	16x16' house	1905
DhMt-33	5	1	14x18' house, 10x14' stable	1906
DhMt-41	2	1	14x14' house, 14x10' house, 22x14' stable	1909
DhMt-42	0	1	same quarter section as above	
DhMt-46	4	3	10x12' house	
DhMt-47	4	1	12x14' house, 16x18' barn	1915
DhMt-48		1	12x14' house, 14x14' house sod house	1905
DhMt-49	0	1	same quarter section as above	
DhMt-51	3	1	--	1915
DiMv-28	3	0	16x20' house, 16x32' stable	1904
DiMv-29	3	0	14x18' house, 18x20' stable	1903
DiMv-30	3	0	same quarter section as above	
DiMv-31	1	0	12x16' house	1916
DiMv-35	2	1	12x12' house, 10x16' stable	1903
DiMv-58	2	0	10x12' house, 14x30' house, 24x24' stable	1904

subsequent years.

Also from Table D.1, it will be noted that the dates of entry all fall within a 13 year period between 1903 and 1916. In fact, only three of the dates are later than 1910. This indicates that much of the Souris valley between Estevan and Weyburn was settled in the first decade of this century.

Whether due to the inconveniences of spring flooding, or the effects of the droughts of the 1930s, it appears that many of the homesteads were abandoned by that time and many of the private land holdings reverted back to the Crown. The result is a set of historic structures which were created, occupied, and abandoned over a relatively circumscribed period of time (30 years).

Historic archaeology in Saskatchewan to date has been primarily concerned with the archaeology of commerce, predominantly the study of fur trade posts. Homesteads potentially represent a far broader range of human activity. In fact there is considerable potential for interpreting homesteading beyond the limited, and probably biased picture presented in the written record. As emphasized by Dunnel (1982:312):

> ...history lies--sometimes on purpose, sometimes accidentally, sometimes benignly, sometimes malignantly, but it lies. The archaeological record, on the other hand, has one outstanding virtue. It can record only what actually transpired...

Given the nature of this sample, the homesteads recorded during this study present a unique opportunity to investigate early twentieth century life in southeastern Saskatchewan. In addition, the narrow time frame over which these structures were used increases their potential for the study of cultural processes. A range of research questions needs to be addressed including the reasons for settlement, the reasons

for abandonment, the patterns of settlement and growth, and a series of questions relating to the historic lifestyle at both the level of the community and the individual farmstead.

D.2.2 Stone Circles

The sample of stone circles recorded during the 1984 study is quite extensive and it is possible to identify certain trends within the collected data. Some limited comparisons are presented to demonstrate the research potential of this sample.

The number of stone circles per site varied from one to greater than 200. This sample of stone circle sites is heavily dominated by sites with 10 rings or less. Sites with 10 rings or less comprise 72% of the sample. This compares favourably with a large sample of stone circles derived from Forty Mile Coulee in southeastern Alberta (Brumley 1983; Dau and Brumley 1984). The major difference between the two samples is that only 1% of the Forty Mile Coulee sites contained more than 35 stone circles while, significantly, over 6% of the Rafferty sites had more than 35 stone circles. While large sites can be the result of multiple occupations, they can also be an expression of larger forms of social organization, i.e. on a "multi-band or tribal level".

The stone circles in the study area ranged from 2.7 to 10 m in diameter. For most of the sites, the mean ring size ranged from 5.0 to 5.4 m. This is slightly larger than stone circle diameters observed in other samples (Finnigan 1982). The significance of this observation, if any, is unknown at this time. It may reflect such factors as ethnicity or seasonality.

As illustrated in Table D.2, 42% of all stone circle subsurface

Table D.2 Stone Circle Assessment Results.

Location	Productive Test	Sterile Test	Total
Center	51.1% (97)	48.9% (93)	190
N Outside	34.8% (16)	65.2% (30)	46
E Outside	31.1% (14)	68.9% (31)	45
S Outside	41.3% (19)	58.7% (27)	46
W Outside	20.6% (7)	79.4% (27)	34

tests contained some cultural material. This figure is high in comparison to other samples of stone circles (see Burley and Fox 1985). The distribution of productive shovel tests in and around the stone circles are quite instructive and should be a guide to future investigations. In this sample, the probability that a test located in the center of a stone circle contained cultural material was 0.51. The probabilities that shovel test located outside of the ring contained cultural material ranged from 0.2 along the west side of the ring, to 0.41 along the south side.

The stone circles sites were then subdivided into size classes to see if the probabilities for a successful subsurface test varied by site size (Table D.3). The probability that a test pit contained cultural material varied from 0.20 for sites with 11 to 20 stone circles, to 0.49 for sites with more than 50 stone circles. It is of considerable interest that many of the larger sites contained cultural material.

In summary, the large size of this sample and the good assessment results make this an excellent potential research sample that, at present, is without parallel in Saskatchewan. Some preliminary comparisons suggest that this sample may not be equalled elsewhere on the Northern Plains. Importantly, these sites could provide an unparalleled opportunity for the study of intra- and inter-site settlement pattern at a regional level. A series of specific research questions need to be addressed such as the relationship of the stone circle to the hide tipi, the intra-site settlement pattern, changes in size/form/structure which have occurred through time, and the size and composition of the group.

Table D.3 Stone Circle Assessment Results by Site Size.

Location	Number of Rings					
	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50	>50
	Percentage of Tests Producing Cultural Material					
Center	50.6%	28.0%	50.0%	47.1%	80.0%	57.1%
N Outside	38.1%	50.0%	100.0%	0.0%	100.0%	28.6%
E Outside	26.9%	33.3%	33.3%	33.3%	--	37.5%
S Outside	41.2%	33.3%	66.7%	20.0%	0.0%	60.0%
W Outside	18.8%	0.0%	33.3%	0.0%	100.0%	33.3%
Total No. Test Pits	169	19	47	32	9	77

D.2.3 Cairns

The number of cairns per site ranged from 1 to 17. Most of the sites contained less than three cairns (83%). In fact, most contained only a single cairn (62%). Similarly, the range of cairn diameters ranged from 0.5 m to over 3.5 m (a cairn measuring 6 m by 4 m was recorded in the valley in 1985 but is not included in this sample). The majority of the cairns are between 1 and 2 m in diameter (61%).

Cairns are a poorly studied site type. The large sample of cairns recorded in this study could revise this status. As none of the cairns were extensively assessed, the potential these features have to contribute to an understanding of group beliefs or settlement pattern is unknown at this time. However, by the very fact that this group of features is understudied, it is of considerable archaeological interest. Some pertinent research questions include what was their distribution through time and space, what was their function, and who made them.

D.2.4 Petroforms

In addition to the stone circle and cairn sites, a number of other stone features were recorded during this study. Although not studied in any detail, these features were classified into five categories: large ovals with possible exterior or interior appendages (n=2), stone circles with central cairns (n=8), double rings (n=2), very small stone circles (n=2), and hollowed-out cairns or rock-lined depressions (n=3). The latter feature type has been noted in North Dakota where they are sometimes associated with burials (Larry Loendorf, personal communication 1986). The function of the other feature types is unknown. Similarly, it is not known whether the number of petroforms found in this study is

typical of the Souris Basin. Some important research questions include what was their distribution through time and space, what was their function, and who made them. Because there are so many unresolved questions concerning this class of features, the sample recorded here is regarded as highly significant.

D.2.5 Buried Sites

The buried sites identified during this study have not been extensively assessed. These sites are located on the flood plain and in some smaller stream valleys, and they appear to range in function from kill/processing areas to camp site situations. It is known from the excavations at Long Creek, that tipi rings are not the only type of habitation remains. However, it is possible that there may be a seasonal or a cultural aspect to river bottom campsite versus tipi ring use. It is also possible that buried tipi rings might be found at some of these habitation sites.

The stratified sites will have considerable importance in developing regional chronologies and in studying culture change. Recent investigation along the Souris (Finnigan 1985b) and along Long Creek (Finnigan 1985a) suggests that these valley systems are characterized by relatively high rates of sedimentation. The importance of this for heritage resources is two-fold. First, rapid sedimentation often results in better preservation of site constituents such as bone and pollen. Second, the faster the rate of sedimentation, the smaller the interval of time that can be examined. As a result, cultural change can be examined on a much finer scale. This will be particularly important during the Late Prehistoric Period where these sites will be able to re-

solve questions related to cultural developments in the region such as the relationship between Besant and Sonota. Beyond this, these sites can answer questions that are relevant to other site types, group size and composition, site selection and settlement pattern questicns, and seasonality.

Taking together the variability in site types, the potential for better preservation, and the potential for studying change at a fine level, there is no question that the sample of buried sites has considerable research significance.

D.3 SUMMARY

This appendix has examined the five types of sites found in the Rafferty Reservoir in 1984, and that are now known to occur within the Alameda Reservoir. All of these site types have demonstrated research potential. A research program that examined these site types would, without doubt, both increase the knowledge of the prehistory and early history of southeastern Saskatchewan, and call into question many of the archaeological assumptions currently held.

D.4 REFERENCES CITED

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APPENDIX E

RESOURCE SIGNIFICANCE EVALUATIONS

1984 RESOURCES

Appendix E.1

Dam Site/Spillway Resources

Site No.	Scientific Significance																Public Significance									
	Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DgMs-30	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	5	1	1	1	1	1
DgMs-31	1	3	1	1	3	1	1	1	3	1	3	1	3	1	1	1	1	1	1	1	1	1	1	5	3	1	1	1	1
DgMs-32	1	4	1	1	4	3	4	3	4	4	3	3	4	3	2	2	3	4	3	2	2	2	2	0	3	3	3	3	3
DgMs-35	2	2	3	2	2	2	2	2	2	2	3	3	2	2	2	3	3	3	2	2	3	2	2	5	2	2	2	2	2
DgMs-36	1	4	1	1	4	3	3	1	4	4	3	3	4	1	1	3	3	3	1	1	1	1	1	3	1	1	1	1	1
DgMs-37	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DgMs-38	3	3	5	3	3	2	2	3	3	2	5	5	3	2	5	5	5	5	3	2	5	5	5	4	5	5	3	3	3
DhMs-3	3	4	1	1	4	1	3	3	4	4	4	3	4	1	3	1	3	3	1	1	3	1	1	0	3	1	1	1	1
DhMs-4	3	4	5	3	4	2	3	3	4	4	3	4	4	3	3	5	4	4	3	2	5	4	5	0	3	3	3	3	3
DhMs-5	2	2	2	2	2	2	2	2	2	2	0	0	2	2	2	1	1	1	1	1	1	1	1	0	1	1	2	1	1
DhMs-6	3	4	2	2	4	2	3	2	4	4	3	3	4	2	2	2	3	3	2	2	3	2	1	0	3	2	2	3	3
DhMs-7	3	4	2	2	4	2	3	3	4	4	3	3	4	2	2	3	3	3	2	3	3	3	2	0	3	3	3	3	3
DhMs-9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DhMs-10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	3	5	5	5	3	5	5	5	5	5
DgMs-46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DgMs-47	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DgMs-48	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2

Appendix E.2

Judgemental Area 1 Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DlMv-16	3	3	2	2	3	3	3	2	3	3	2	3	3	3	2	3	4	3	2	3	1	2	2	5	3	3	2	2	2
DlMv-28	5	4	3	4	4	2	3	3	4	4	5	5	4	3	3	3	3	3	3	3	3	3	3	6	3	1	2	2	2
DlMv-29	4	4	2	3	4	2	2	2	4	4	3	4	4	2	2	2	3	3	3	3	3	3	3	6	2	1	2	2	2
DlMv-30	4	4	2	3	4	2	2	2	4	4	3	4	4	2	2	2	3	3	3	3	3	3	3	6	2	1	2	2	2
DlMv-31	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DlMv-32	3	3	2	3	3	3	3	2	3	4	1	3	3	3	3	2	1	1	1	1	1	1	1	6	3	3	3	3	3
DlMv-33	3	3	2	2	3	3	2	2	3	4	2	2	3	2	2	2	1	1	1	1	1	1	1	0	1	1	1	2	2
DlMv-34	5	5	4	4	5	4	4	2	5	5	3	3	5	3	3	2	2	2	2	2	1	1	1	4	1	2	3	3	3
DlMv-35	5	5	5	4	5	4	4	4	5	5	4	4	5	4	3	2	4	3	2	3	4	4	4	4	4	1	3	3	3
DlMv-36	3	3	4	4	3	4	4	2	3	4	3	3	3	3	3	3	1	1	3	3	1	3	1	4	2	2	3	3	3
DlMv-37	5	2	2	3	2	1	3	2	2	1	2	3	2	3	3	1	3	3	2	1	1	1	1	4	1	1	3	1	1
DlMv-38	5	5	4	3	5	5	5	3	5	5	3	3	5	3	3	3	4	4	3	3	1	3	2	3	3	3	4	4	4
DlMv-39	3	3	1	2	3	3	2	2	3	3	2	2	3	2	2	2	1	1	1	1	1	1	1	6	2	2	2	2	2
DlMv-40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DlMv-41	2	2	1	1	2	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DlMv-42	4	3	2	2	3	3	3	3	3	3	2	3	3	2	2	2	1	1	1	1	1	1	1	0	1	1	2	2	2
DlMv-43	3	3	1	1	3	2	2	2	3	3	2	2	3	2	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1
DlMv-44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DlMv-45	3	2	3	2	3	2	2	2	3	2	3	3	3	2	2	3	1	1	1	1	1	1	1	4	1	1	1	1	1
DlMv-46	2	2	3	3	2	2	2	3	2	2	3	3	3	2	2	3	3	2	1	1	3	3	3	4	1	1	2	2	2
DlMv-69	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	2	2	2	2	2

Appendix E.3

Judgemental Area 2 Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DiMu-6	2	3	3	3	3	2	3	3	3	3	3	3	3	2	2	1	1	1	1	1	1	1	1	5	1	1	1	1	1
DiMu-7	2	2	1	2	2	2	2	2	2	1	3	3	3	2	2	2	1	1	1	1	1	1	1	5	1	1	1	1	1
DiMu-8	4	3	3	3	3	2	3	2	3	2	2	2	3	3	3	1	1	1	1	1	1	3	1	0	1	1	1	1	1
DiMu-9	2	3	1	2	3	1	1	1	3	1	1	1	3	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DiMu-10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DiMu-11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DiMu-12	3	3	1	1	3	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	1	1	1	5	1	1	1	1	1
DiMu-13	3	3	2	2	3	2	3	3	3	3	3	3	3	2	2	2	3	3	0	1	1	1	1	0	3	1	3	3	3
DiMu-14	3	3	3	3	3	2	2	2	3	2	0	4	3	3	3	3	3	3	2	2	3	3	3	0	3	1	2	2	2
DiMu-15	3	3	3	3	3	3	3	3	3	2	1	3	3	2	2	3	3	3	2	2	1	1	1	0	1	1	3	1	1
DhMu-3	1	1	1	1	1	1	1	1	1	1	3	3	1	1	1	1	3	3	1	3	3	1	1	5	1	1	1	1	1

Appendix E.4

Judgemental Area 3 Resources

	Scientific Significance																Public Significance									
	Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Historic/ Ethnic			On-site Interperation			Display		
Site No.	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DgMs-33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DgMs-34	2	3	2	2	3	3	3	3	3	2	3	2	3	2	2	2	2	2	2	2	3	2	1	4	2	2	2	2	2
DhMt-16	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DhMt-22	2	2	7	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2
DhMt-23	3	3	1	2	3	2	3	2	3	2	1	3	3	2	2	1	1	1	1	1	1	1	1	0	1	1	3	1	1
DhMt-25	3	3	2	3	3	3	3	3	3	4	0	3	3	2	2	2	1	1	2	1	1	1	1	4	3	3	3	3	3
DhMt-28	4	4	5	3	4	4	4	4	4	4	4	4	4	3	3	3	1	1	1	1	3	3	3	4	3	2	3	3	3
DhMt-29	3	3	1	3	3	2	2	2	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-34	4	4	5	4	4	4	4	3	4	4	3	3	4	3	3	2	3	3	2	2	3	3	3	6	1	1	3	3	3
DhMt-35	3	4	4	3	4	4	3	3	4	4	1	3	4	3	3	2	1	1	1	1	1	2	1	0	1	1	3	3	3
DhMt-36	3	4	3	3	4	4	4	3	4	4	3	3	4	3	3	2	1	1	1	1	1	2	1	0	1	1	3	3	3
DhMt-37	4	4	3	3	4	2	3	2	4	2	1	3	4	2	2	2	1	1	1	1	3	3	1	4	3	1	2	2	2
DhMt-43	4	3	2	3	4	3	3	2	4	3	2	3	4	3	3	2	1	1	1	1	1	1	1	3	1	1	3	2	2
DhMt-56	2	2	2	3	2	2	2	2	2	2	3	3	2	2	2	3	3	3	1	1	1	2	2	3	3	3	2	2	2
DhMt-58	2	2	1	2	2	2	2	2	2	2	0	3	2	2	2	2	1	1	1	1	1	1	1	5	1	1	2	2	2
DhMu-4	2	3	3	3	3	2	2	3	3	2	3	3	3	2	2	3	1	1	2	1	1	1	1	0	1	1	1	1	1
DhMu-5	3	3	2	3	3	3	3	2	3	3	2	3	3	3	2	1	2	2	1	1	1	1	1	4	1	1	3	3	3
DhMu-6	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	1	1	3	3	1	5	3	3	3	2	2
DhMu-24	3	2	4	3	2	1	1	1	2	0	0	4	2	3	3	3	3	3	3	2	3	3	3	5	3	1	2	3	2
DhMu-25	2	3	1	2	3	2	2	3	3	2	3	3	3	2	2	1	1	1	1	1	3	3	1	4	2	1	1	1	1
DhMu-37	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DhMu-38	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DlMv-47	2	1	3	2	1	1	1	1	1	1	0	3	1	2	2	2	2	2	2	2	1	1	1	4	1	0	1	1	1
DlMv-48	2	3	2	3	3	2	2	2	3	2	2	3	3	2	2	1	3	2	1	1	1	1	1	0	1	1	2	2	2
DlMv-49	2	3	2	3	3	2	2	2	3	2	3	3	3	2	2	1	3	2	1	1	1	1	1	0	1	1	2	2	2
DlMv-51	4	3	4	4	3	2	3	2	3	3	1	3	3	3	3	2	1	1	3	1	1	1	1	5	2	1	3	2	2
DlMv-53	1	1	1	2	1	1	1	1	1	1	0	2	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1

Appendix E.5

Judgemental Area 4 Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DhMs-8	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	0	1	1	1	1	1
DhMt-1	1	2	1	2	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-2	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1
DhMt-3	4	4	4	3	4	4	3	2	4	3	2	3	4	2	2	2	1	1	1	2	1	1	1	3	1	1	2	2	2
DhMt-4	1	1	3	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-5	2	3	2	2	3	3	2	2	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-6	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-7	3	3	2	3	3	3	3	3	3	4	3	3	3	3	2	2	2	2	1	1	2	2	2	3	3	1	3	3	3
DhMt-8	4	3	2	2	3	2	3	3	3	2	3	3	3	2	2	2	1	1	1	1	3	3	1	1	3	1	2	2	2
DhMt-9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DhMt-10	3	3	4	3	3	2	3	3	3	4	3	3	3	3	3	3	3	3	3	2	3	3	3	0	3	3	3	3	3
DhMt-52	3	3	3	3	3	4	3	2	3	4	2	3	3	2	2	1	1	1	1	1	3	2	1	0	3	1	3	3	3
DhMt-57	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	1	1	1	1	1	3	3	3	0	3	1	3	3	3

Appendix E.6

Judgemental Area 5 Resources

Site No.	Scientific Significance																Public Significance								
	Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DhMt-24	3	3	2	3	3	3	3	3	3	3	1	3	3	3	2	2	1	1	1	1	3	3	1	0	1	1	2	3	3
DhMu-8	5	5	5	5	5	5	5	3	5	5	4	5	5	5	5	2	3	1	5	1	1	1	3	3	1	1	4	4	5
DhMu-11	3	3	1	2	3	4	2	2	3	4	0	3	3	2	2	1	1	1	1	1	1	1	1	3	1	1	2	2	2
DhMu-32	3	3	2	3	3	2	2	1	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DhMu-33	4	4	4	3	4	2	3	3	3	3	3	3	3	2	2	2	1	1	1	1	3	3	3	0	3	1	2	3	3
DhMu-34	3	3	2	2	3	2	2	2	3	3	1	3	3	2	2	3	1	1	1	1	1	1	1	0	1	1	2	2	2
DhMu-35	3	3	1	2	3	2	2	2	3	2	1	2	3	2	2	1	1	1	1	1	1	1	1	0	1	1	2	2	2

Appendix E.7

Judgemental Area 6 Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DhMt-13	3	3	2	2	3	3	2	2	3	3	3	3	3	2	2	1	1	1	1	1	1	1	1	0	1	1	2	2	2
DhMt-14	3	3	3	3	3	3	2	2	3	3	3	3	3	2	2	2	3	1	1	1	1	1	1	2	1	1	2	2	2
DhMt-15	3	3	2	3	3	3	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	3	0	1	2	2	2
DhMt-17	3	3	1	3	3	3	2	2	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	3	0	1	1	1	1
DhMt-18	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2
DhMt-19	2	2	3	2	2	2	2	2	2	2	3	3	2	2	2	3	1	1	1	1	1	1	1	3	1	1	2	1	1
DhMt-20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-21	4	4	4	3	4	3	3	2	4	3	2	3	3	3	2	1	1	1	1	1	1	1	1	3	1	1	3	3	3
DhMt-26	4	3	4	3	3	4	2	2	3	3	3	3	3	2	2	1	1	1	1	1	3	4	3	0	1	1	2	2	2
DhMt-27	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	2
DhMt-30	2	2	2	2	2	2	2	2	2	2	3	3	2	2	2	3	1	1	1	1	1	1	1	3	1	1	2	2	2
DhMt-31	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-32	3	3	2	3	3	3	2	3	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	3	1	1	3	3	3
DhMt-33	4	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1	3	3	1	3	1	1	2	3	3
DhMt-38	3	3	1	3	3	3	3	2	3	3	0	3	3	2	2	2	1	1	1	1	1	1	1	0	1	1	3	3	3
DhMt-39	1	1	3	3	1	1	1	1	1	1	1	3	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1
DhMt-40	3	3	2	3	3	3	3	3	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	0	0	0	2	2	2
DhMt-41	3	3	1	3	3	2	3	2	3	2	3	3	3	2	2	2	1	1	1	1	3	3	1	4	1	1	2	3	3
DhMt-42	3	3	1	3	3	2	2	2	3	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2
DhMt-44	1	2	1	1	2	3	1	1	2	2	1	3	2	2	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DhMt-45	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMt-46	4	4	3	3	4	3	3	3	4	3	3	3	4	3	3	2	1	1	1	1	3	3	3	5	3	1	3	3	3
DhMt-47	4	3	3	3	3	2	2	3	3	2	3	3	3	2	2	2	1	1	1	1	3	3	2	0	3	1	2	2	3
DhMt-48	4	2	2	2	2	2	2	2	2	2	0	3	2	2	2	2	1	1	1	1	1	1	1	3	1	1	2	2	2
DhMt-49	4	2	2	2	2	2	2	2	2	2	0	3	2	2	2	2	1	1	1	1	1	1	1	3	1	1	2	2	2
DhMt-50	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DhMt-51	4	3	3	3	3	2	3	3	3	3	3	3	3	2	2	2	1	1	1	1	3	3	1	4	3	1	2	3	3
DhMt-53	2	2	1	3	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1	4	1	1	2	2	2
DhMt-54	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DhMt-55	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	2	1	1	1	1	1	1	1	0	1	1	1	1	1

Appendix E.7 (Continued)

Judgemental Area 6 Resources (cont'd)

Site No.	Scientific Significance																Public Significance								
	Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DhMu-7	3	3	4	3	3	3	2	2	3	3	2	3	3	2	2	3	3	3	2	1	3	3	3	4	1	1	2	2	2
DhMu-8	3	3	1	3	3	3	2	2	3	3	0	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	2	2	2
DhMu-10	4	4	3	3	4	3	3	2	4	4	3	3	4	2	2	3	3	3	2	1	3	2	3	3	3	2	3	3	3
DhMu-12	5	5	5	5	5	5	5	3	5	5	4	5	5	5	5	2	3	1	5	1	1	1	3	4	1	1	2	3	3
DhMu-13	3	3	1	3	3	3	2	3	3	3	2	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	2	3	3
DhMu-14	2	2	1	2	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1	4	1	1	2	2	2
DhMu-15	2	2	2	3	2	2	2	2	2	3	3	3	2	2	2	1	1	1	1	1	1	1	1	4	1	1	2	2	2
DhMu-16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2
DhMu-17	3	3	5	4	3	2	3	3	3	2	3	4	3	2	3	4	3	3	3	1	1	1	2	2	3	1	2	2	2
DhMu-18	3	3	1	3	3	3	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	0	1	1	3	3	3
DhMu-19	3	3	1	3	3	3	3	2	3	4	1	3	3	2	2	1	1	1	1	1	1	1	1	0	0	0	3	3	3
DhMu-20	3	3	2	3	3	3	3	2	3	3	3	3	3	2	2	2	1	1	1	1	1	1	1	0	1	1	3	3	3
DhMu-21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DhMu-22	2	1	3	3	1	1	1	1	1	1	1	3	1	1	1	3	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMu-23	2	2	2	2	2	1	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1
DhMu-26	3	3	3	3	3	2	3	2	3	2	0	3	3	2	2	2	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMu-27	4	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	1	1	1	1	3	3	3	3	3	1	3	3	3
DhMu-28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DhMu-29	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	2
DhMu-30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1
DhMu-31	2	2	1	2	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1	0	1	1	2	2	2
DhMu-36	2	2	1	2	2	3	2	2	2	1	3	3	2	1	1	1	3	3	1	1	3	3	1	0	3	1	1	1	1
DhMv-1	3	3	4	3	3	2	3	2	3	3	2	3	3	2	2	3	3	3	3	1	1	1	1	4	1	1	3	3	3
DhMv-2	3	3	1	3	3	2	2	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	5	1	1	2	2	2
DiMv-26	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
DiMv-50	3	3	2	3	3	2	2	2	3	3	2	3	3	3	2	1	1	1	1	1	1	1	1	4	3	1	2	2	2

Appendix E.8

Judgemental Area 7 Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DiMv-17	2	2	4	3	2	2	2	2	2	2	3	3	2	2	2	3	3	3	3	1	1	1	3	4	1	1	2	2	2
DiMv-18	3	3	3	3	3	2	3	2	3	4	4	3	3	3	3	2	1	1	3	1	3	2	2	3	2	2	3	3	3
DiMv-19	1	1	3	3	3	1	1	1	1	1	1	3	1	1	1	2	1	1	1	1	1	1	1	4	1	1	1	1	1
DiMv-20	2	3	1	3	3	2	2	2	3	3	1	3	3	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
DiMv-21	3	3	1	3	3	2	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	3	3	3
DiMv-22	3	3	1	3	3	2	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	3	3	3
DiMv-23	3	3	1	3	3	3	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	3	3	3
DiMv-24	2	2	4	3	2	2	2	2	2	2	2	3	2	2	2	3	3	3	3	1	1	1	1	4	1	1	3	3	3
DiMv-25	2	3	1	2	3	2	2	2	3	3	3	3	3	2	2	2	1	1	1	1	1	1	1	4	1	1	2	2	2
DiMv-27	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1	1	1	1	1	4	1	1	2	2	2
DiMv-52	2	2	4	4	2	2	2	2	2	2	0	4	2	2	2	3	1	1	3	1	3	3	3	4	3	3	3	3	3
DiMv-54	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	1	1	1	1	1
DiMv-55	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	2
DiMv-56	3	2	3	3	2	3	2	3	2	3	2	3	2	2	2	1	3	3	1	2	2	2	2	4	2	2	2	2	2
DiMv-57	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	3	3	3
DiMv-58	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	3	3	1	4	2	2	2	2	2
DiMv-59	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	3	3	3
DiMv-60	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	2	2	2	2
DiMv-61	5	5	3	4	5	4	4	4	5	3	3	3	5	3	3	2	3	3	3	3	2	2	2	1	2	2	2	2	2
DiMv-62	3	4	3	4	4	4	2	2	4	3	2	3	4	2	2	2	3	3	3	3	3	3	3	4	3	3	4	4	4
DiMv-63	3	3	4	4	3	4	3	3	3	3	2	3	3	2	2	2	3	3	3	3	2	2	2	0	3	3	2	2	2
DiMv-64	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	3	3	3	3	3
DiMv-65	3	4	3	4	4	3	2	4	4	3	2	3	4	2	2	2	3	3	3	3	2	2	2	4	2	2	2	2	2
DiMv-66	3	3	1	3	3	3	3	2	3	3	1	3	3	2	2	1	1	1	1	1	1	1	1	0	3	3	2	3	3
DiMv-67	2	2	3	2	2	2	2	2	2	2	2	3	2	2	2	3	1	1	1	1	1	1	1	4	1	1	2	2	2
DiMv-68	2	2	3	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2

Appendix E.9

Judgemental Area B Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Public Significance: Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DjMu-22	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DjMu-23	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DjMu-24	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DjMu-25	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DjMu-26	3	2	4	3	3	2	2	2	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	5	3	3	2	2	2
DjMu-27	5	5	5	5	5	5	5	5	5	5	5	5	5	3	3	2	3	3	3	3	3	3	3	3	4	4	4	4	4
DjMu-28	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Appendix E.10

New Reservoir Resources

Site No.	Scientific Significance																Historic/ Ethnic			On-site Interperation			Display		
	Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement										
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DlHv-70	4	2	5	3	2	2	3	2	2	2	1	3	2	1	1	1	3	1	1	1	1	3	1	2	1	1	1	1	1
DlHv-71	2	2	2	2	2	2	2	2	2	3	1	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1
DlHv-72	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DlHv-73	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DlHv-74	2	2	2	2	2	2	2	2	2	3	1	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DlHv-75	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DlHv-76	2	2	2	2	2	2	2	2	2	3	1	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DlHv-77	2	3	2	2	3	2	3	2	3	3	3	3	3	2	2	2	3	3	2	1	2	2	2	3	2	2	2	2	2
DlHv-78	3	3	5	3	3	2	3	3	3	3	3	4	3	2	3	4	3	3	3	2	4	4	3	1	3	2	2	2	3
DjHw-30	2	2	5	3	2	2	2	2	2	3	3	4	2	2	3	4	3	3	3	4	4	4	3	5	2	2	2	2	3
DjHw-31	3	3	5	4	3	3	3	3	3	3	4	4	3	2	3	4	3	3	3	2	4	4	3	5	3	3	2	3	3
DjHw-32	2	2	2	2	2	2	2	2	2	3	2	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1
DjHw-33	2	3	2	3	3	2	3	2	3	3	3	3	3	2	2	2	2	2	1	1	3	2	1	3	2	2	2	2	2
DjHw-34	3	2	2	3	2	3	3	2	2	2	2	3	2	2	2	1	3	2	1	1	1	3	1	3	3	3	2	3	3
DjHw-35	2	2	2	2	2	2	3	2	2	2	2	3	2	2	2	2	3	1	1	1	1	1	1	3	1	1	2	3	3
DjHw-36	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	1	1	3	1	1	2	2	2
DjHw-37	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	1	1	3	1	1	2	2	2
DjHw-38	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	1	1	3	1	1	2	2	2
DhMt-64	4	4	3	4	4	2	2	4	4	3	4	4	4	2	2	2	3	3	3	2	3	3	2	0	3	2	2	2	2
DhMs-12	5	4	5	5	4	5	5	5	4	4	4	5	4	3	3	2	4	4	4	3	4	4	4	0	4	4	5	5	5
DhMt-59	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	0	1	1	2	1	1
DhMt-60	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	0	1	1	2	1	1
DhMt-61	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	1	1	1	1	0	1	1	2	1	1
DhMt-62	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	0	1	1	2	1	1
DhMt-63	2	3	2	3	3	2	3	2	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	0	1	1	2	1	1
DhMs-11	3	3	2	3	3	3	3	2	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	0	1	1	2	1	1
DhMs-13	3	3	2	2	3	3	2	2	3	2	2	3	3	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1

Appendix E.11

Alameda Resources

Site No.	Scientific Significance: Culture History				Subsistence/ Technological				Settlement Pattern				Group Lifeway				Advancement				Historic/ Ethnic			On-site Interperation			Display		
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	A	B	C	A	B	C
DiHm-1	3	2	4	3	2	3	3	2	2	2	2	3	2	3	3	3	3	2	3	2	1	1	1	0	1	1	4	3	3
DiHm-4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHm-5	4	3	4	3	3	4	3	4	3	3	3	3	3	2	3	3	3	3	3	2	3	3	2	0	2	2	3	3	3
DjHm-2	2	2	4	3	2	2	2	2	2	2	2	3	2	2	3	3	2	2	2	2	2	2	2	4	2	2	2	2	2
DjHn-1	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHn-3	2	3	2	3	3	2	3	2	3	3	3	3	3	2	2	2	3	3	1	1	1	3	1	1	2	2	2	2	2
DiHn-4	3	2	2	2	2	3	3	2	2	2	2	3	2	2	2	2	2	2	1	1	1	2	1	1	2	2	2	2	2
DiHn-5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2
DiHn-6	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
DiHn-7	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHn-8	2	2	2	2	2	2	3	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2
DiHm-7	3	2	2	2	2	2	3	2	2	2	2	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1
DiHn-9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHn-10	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHn-11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2
DiHn-12	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2

APPENDIX F

RAFFERTY IMPOUNDMENT PROJECT

HERITAGE RESOURCE IMPACT MANAGEMENT PROGRAM

GENERAL TERMS OF REFERENCE

Souris Basin Development Authority

April 1987

1. Introduction

The Souris Basin Development Authority proposes to construct an earth-fill dam on the Souris River, upstream of the City of Estevan, Saskatchewan.

The project master schedule anticipates project approval in Fall, 1987 with construction starting as early as late Winter, 1988. The project could be completed in Fall 1990. The pondage would begin filling as early as Spring, 1989 and could reach full supply level by early Spring, 1991.

Upon completion, a 40 km long reservoir would be created. It would have a full supply level of 549.5 m asl and inundate approximately 3840 ha of the Souris River Valley and tributaries.

Two hundred and nineteen (219) heritage sites have been located in the original project area. The precision of this figure and others presented below are uncertain due to a downstream relocation of the damsite and resulting changes in the pondage. Partial baseline archaeological and historic resource information is available for the project area. Herein, general terms of reference are provided which outline a program, satisfactory to Saskatchewan Parks, Recreation and Culture to identify and mitigate impacts to heritage resources known and predicted to occur within the scope of the Rafferty project.

Under the Heritage Property Act, an impact management program is required of the Souris Basin Development Authority. Accordingly, the Archaeological Resource Management Section (ARMS), Heritage Resources Branch, Saskatchewan Parks, Recreation and Culture has assisted the Souris Basin Development Authority in drafting broad terms of reference for such a program. Insufficient baseline data and the fact it is not ARMS' policy to specify precisely how consultants should carry out such programs preclude the provision of more detailed terms of reference.

2. Goals and Objectives

The goal of the impact management program is to conserve significant heritage resources and the information they contain that would otherwise be lost by the construction of the Rafferty Reservoir and Dam.

The objectives of the impact management program will be to 1) identify the majority of archaeological and historic resources within the project area; 2) assess a representative sample of these resources and 3) mitigate impacts to a representative sample of resources shown by the assessment program (2) to be of importance to the understanding and appreciation of the prehistory and history of southeastern Saskatchewan.

The impact management program shall be carried out according to current standards of archaeological/historic research and resource management and in such a fashion that legitimate gains to knowledge will be made. THE PROGRAM WILL BE UNDERTAKEN ACCORDING TO AN OVERALL PROJECT RESEARCH DESIGN

acceptable to the proponent and Saskatchewan Parks, Recreation and Culture, and subject to available funding. The program will be executed in the most efficient and economical fashion possible.

Where feasible, and mutually acceptable to the proponent and Saskatchewan Parks, Recreation and Culture, mitigation of impacts will involve, in descending order, resource avoidance, conservation, and salvage.

3. Study Area

The study area encompasses all areas to be affected 1) by construction activities (including the dam site, service spillway, emergency spillway, access roads, aggregate borrow areas, work camps, and ancillary construction facilities), 2) the excavation of an interconnecting canal, 3) inundation, 4) shoreline retreat and erosion, and 5) project related construction activities (new reservoir access roads and other facilities). Present information is insufficient to specify in detail the location and extent of project facilities apart from the dam site and the proposed pondage.

Current land use in the original study area consists of rangeland (57%), hayland (14%) and cropland (10%). Remaining terrain comprises wetlands, water, disturbed and recreational areas. Information on land tenure and accessiblity is available from the Souris Basin Development Authority.

4. Baseline Archaeological Data

The Rafferty project area has been partially surveyed for archaeological resources by the Saskatchewan Research Council. A maximum of 900 ha (19%) of the original project area judged to be of high potential has been inventoried. The results of this program disclosed several significant heritage resources. The range of known and reported site types include: stone circles, petroforms, a vision quest, cairns, petroforms, bison kill sites, and buried campsites. As well, a suspected burial mound is known and outlier Middle Missouri horticultural sites may be discovered. If burial mounds or horticultural village sites are confirmed, the significance of these resources could be judged sufficiently high to warrant variance from impact management guidelines in effect. Contingency funding for mitigation of impacts to such resources would be necessary.

Surface finds suggest the general area has been inhabited since the PaleoIndian (ca. 10 000 B.P.) Period. However, the earliest diagnostic artifact recovered from the Souris valley dates to the Early Middle Prehistoric Period.

The first sytematic survey of the area was carried out by the Saskatchewan Research Council (SRC) in 1984. This was reinforced by additional survey and limited site assessments in 1986.

Approximately 220 archaeological and historic sites have been inventoried for the general project area. These include 100 stone circle sites, 26 historic resources, 35 buried sites, 35 stone circle and cairn sites, 12 cairn sites, 13 petroform sites, a burial mound and a vision quest site. While several resources were assessed in 1986, including the Ratigan tipi ring site and the Sanderson bison kill, a report on these activities is not yet available.

In total, SRC predicts approximately 300 sites to occur in the general project area, approximately 180 of which would lie at or below full supply level.

5. Core Study Requirements

5.1. First Year (Inventory/Assessment/Emergency Salvage) (1987/88)

Inventory: All remaining high potential areas, including the Dr. Mainprize Park area, the junction of the Souris River and Jewel Creek, and effected parts of the Souris River, Jewel and Roughbark Creeks, will be surveyed for archaeological resources. In addition, the damsite, spillways, construction facilities, interconnecting canal, appurtenant project features and the first stage inundation zone will be examined. A mix of surface inspection and subsurface testing procedures will be employed, depending upon local topographic and geomorphological considerations. Where feasible, mechanical testing, trenching and stripping will be used.

An areal sample of up to 50% of all medium potential areas will be selected and similarly inspected. The sampling method (e.g., simple random, stratified, systematic or judgemental) will be determined on the basis of practicality and cost-efficiency.

Local landowners and avocationalists will be interviewed for information on archaeological resources in the project area.

All located resources will be recorded per standard procedures. This will include the preparation of a site map showing all surface features plus the location of all test units and collected artifacts.

Assessment: Up to 50% of all recorded resources, selected according to representivity considerations, will be assessed in such a fashion as to attempt to obtain the following parameters - site size, depth, contents, surface artifact assemblage (including provenience), surficial feature arrangement and complexity, chronology, function, and ethnic or historical affiliation. Attention will be directed initially to all resources found in project areas to be affected during 1988 and 1989.

Emergency Mitigation: All resources assessed as significant which will be unavoidedly affected by pre-construction activities (e.g.,

aggregate testing, road construction, test drilling, etc.) will be salvage excavated. All significant resources located in the immediate damsite area will be subject to scientific excavation.

Ancilliary Studies: The potential for supporting paleoenvironmental studies, including geology and paleoecology, within the study area will be evaluated. Additionally, the need for ethnohistoric, historical and/or archival studies will be appraised. Furthermore, the possiblity for public interpretation/presentation of select resources for tourism, educational, and public participation opportuntities will be assessed.

Reporting: A report will be prepared by March 31, 1988 detailing the results of the inventory, assessment and mitigation program. All identified resources will be assigned significance ratings according to criteria determined in discussion with the Heritage Resources Branch, Saskatchewan Parks, Recreation and Culture. The report shall contain recommendations for further assessment and mitigation work in the immediate impact areas (e.g., damsite and ancillary construction features) as well as for further survey and assessment in the reservoir. The report shall discuss the need for and means to carry out any ancillary studies.

5.2. Construction Phase

Mitigation: Based on the Year 1 program, all sites judged sufficiently significant which will be unavoidably affected by first stage inundation impacts will be excavated in such a fashion as to obtain a representative sample of their informational content. As construction progresses, impact mitigation will become the major impact management activity. The major focus of archaeological activity will be to recover information from resources which will be inundated and/or experience shoreline erosion. Resource selection shall be made on the basis of site significance, size and complexity, and immediacy of impact.

Inventory: Additional unsurveyed areas will be sampled as required for the presence of archaeological resources. This program will be carried out consistent with the procedures described in Section 5.1.

Assessment: Up to 25% of all recorded resources will be assessed carried out in conformity with the procedures described in Section 5.1.

Ancilliary Studies: If deemed appropriate by Saskatchewan Parks, Recreation and Culture in consultation with the Souris Basin Development Authority, paleoenvironmental studies will be undertaken to acquire information on the study area's geology and paleoecology. As well, any additional archival or historical research so approved will be initiated.

Reporting: Reports on the impact management project will be prepared annually and submitted by March 31, of the following year. These reports will detail the results of the inventory, assessment and mitigation programs. All identified resources will be assigned significance ratings according to criteria determined in discussion with Saskatchewan Parks, Recreation and Culture. Reports shall contain recommendations on the need for further assessment and mitigation work in the immediate impact areas (e.g., damsite and ancillary construction features,inundation zones, etc.) as well as for further survey and assessment in the reservoir. The report shall contain the results of, and discuss the need for and means to carry out further, ancillary studies.

As well, site reports for all resources for which mitigatory studies have been completed should be prepared within one year of completion of excavation. The results of ancilliary studies will be reported and incorporated into a general report detailing the results of the overall research design.

5.3 Post-Project Monitoring and Mitigation

Periodic Monitoring/Impact Mitigation: Archaeological activity following project construction will be directed to identifying any resources exposed by bank retreat or shoreline erosion; assessing the extent of impacts; and mitigating impacts to significant resources experiencing reservoir induced disturbances.

This program will be carried out on an annual basis at least three times over the 10 year period following reservoir filling.

Reporting: Final reports on the results of the impact management program, including all site reports and ancillary studies, will be prepared. These will be submitted no later than two years following the date of project completion. In addition, reports on the reservoir monitoring/impact mitigation program will be prepared as necessary.

ALAMEDA IMPOUNDMENT PROJECT

HERITAGE RESOURCE IMPACT MANAGEMENT PROGRAM

GENERAL TERMS OF REFERENCE

Souris Basin Development Authority

April 1987

1. Introduction

The Souris Basin Development Authority proposes to construct an earth-fill dam on Moose Mountain Creek, approximately 15 km upstream of its confluence with the Souris River at the Town of Oxbow, Saskatchewan.

The project master schedule anticipates project approval in mid-1988 with construction starting in early Spring, 1989. The project could be completed in late-Fall, 1990, although the pondage could begin filling as early as mid-Spring 1989.

Upon completion, a 29 km long reservoir would be created. It would have a full supply level of 574 m asl and inundate approximately 1300 ha (13 sq. km).

Appreciating that very little baseline information is available for the project area, herein, general terms of reference are provided which outline a program, satisfactory to Saskatchewan Parks, Recreation and Culture to identify and mitigate impacts to heritage resources known and predicted to occur within the scope of the Alameda project.

Under the Heritage Property Act, an impact management program is required of the Souris Basin Development Authority. Accordingly, the Archaeological Resource Management Section (ARMS), Heritage Resources Branch, Saskatchewan Parks, Recreation and Culture has assisted the Souris Basin Development Authority in drafting broad terms of reference for such a program. Insufficient baseline data and the fact it is not ARMS' policy to specify precisely how consultants should carry out such programs preclude the provision of more detailed terms of reference.

2. Goals and Objectives

The goal of the impact management program is to conserve significant heritage resources and the information they contain that would otherwise be lost by the construction of the Alameda Reservoir and Dam.

The objectives of the impact management program will be to 1) identify the majority of archaeological and historic resources within the project area; 2) assess a representative sample of these resources and 3) mitigate impacts to a representative sample of resources shown by the assessment program (2) to be of importance to the understanding and appreciation of the prehistory and history of southeastern Saskatchewan.

The impact management program shall be carried out according to current standards of archaeological/historic research and resource management and in such a fashion that legitimate gains to knowledge will be made. THE PROGRAM WILL BE UNDERTAKEN ACCORDING TO AN OVERALL PROJECT RESEARCH DESIGN acceptable to the proponent and Saskatchewan Parks, Recreation and Culture, and subject to available funding. The program will be executed in the most efficient and economical fashion possible.

Where feasible, and mutually acceptable to the proponent and Saskatchewan Parks, Rec.eation and Culture, mitigation of impacts will involve, in descending order, resource avoidance, conservation, and salvage.

3. Study Area

The study area encompasses all areas to be affected 1) by construction activities (including the dam site, access roads, aggregate borrow areas, work camps, and ancillary construction facilities), 2) inundation, 3) shoreline retreat and erosion, and 4) project related construction activities (new access roads and other facilities). Present information is insufficient to specify in detail the location and extent of project facilities apart from the dam site and the proposed pondage.

Current land use in the study area consists of rangeland (58%), hayland (6%) and cropland (4%). Remaining terrain comprises wetlands, water, disturbed and recreational areas. Information on land tenure and accessiblity is available from the Souris Basin Development Authority.

4. Baseline Archaeological Data

The Alameda project area has been subjected to limited professional archaeological study. Notwithstanding, its potential for significant heritage resources is judged high. The range of known and reported site types within the Moose Mountain Creek drainage comprises: stone circles, cairns, petroforms, bison kill sites, and buried campsites. As well, a suspected burial mound is known and outlier Middle Missouri horticultural sites may be discovered. If burial mounds or horticultural village sites are identified, the significance of these resources could be judged sufficiently high to warrant variance from the guidelines furnished herein. Contingency funding for mitigation of impacts to such resources would be necessary.

Surface finds suggest the general area has been inhabited since the PaleoIndian (ca. 10 000 B.P.) period.

The first survey of the area was carried out by the Saskatchewan Research Council (SRC) in 1986. Its brief reconnaissance, SRC recorded 11 sites.

In total, 16 sites are known for the project area. These include 10 stone features (one may contain an associated burial mound), 3 campsites, a findspot, a lithic scatter, and a kill/processing site. None have been thoroughly assessed.

Based on its experience in the Souris Basin, the SRC (1986) suggests 300 ha (23%) of the study area has a high potential for heritage resources. These areas include 22 stream confluences with the Moose Mountain Creek. SRC estimates 32 resources will occur in high potential areas. SRC rates the

entire remaining 1900 ha. as medium potential with a projected resource base of 79 sites. In total, 111 sites are expected to occur in the study area. However, SRC suggest this amount could be as high as 167 sites. Seven farmsteads, 27 buried sites and 77 stone circle sites are anticipated. These projections remain untested.

5. Core Study Requirements

5.1. Year 1 (Inventory/Assessment/Emergency Salvage) (1987/88)

Inventory: All areas of judged high potential will be surveyed for archaeological resources. In addition, the damsite, construction facilities, borrow areas, new access roads and appurtenant project features will be examined. A mix of surface inspection and subsurface testing procedures will be employed, depending upon local topographic and geomorphological considerations. Where feasible, mechanical trenching and stripping will be used.

A minimum areal sample of 25% of all medium potential areas ($\leq$475 ha) will be selected and similarly inspected. The sampling method (e.g., simple random, stratified, systematic or judgemental) will be determined on the basis of practicality and cost-efficiency.

Local landowners and avocationalists will be interviewed for information on archaeological resources in the project area.

All located resources will be recorded per standard procedures. This will include preparation of a site map showing all surface features plus the location of all test units and collected artifacts.

Assessment: Up to 50% of all recorded resources, selected according to representivity considerations, will be assessed in such a fashion as to attempt to obtain the following parameters - site size, depth, contents, surface artifact assemblage (including provenience), surficial feature arrangement and complexity, chronology, function, and ethnic or historical affiliation. Attention will be directed initially to all resources found in project areas to be affected during 1988 and 1989.

Emergency Mitigation: All resources assessed as significant which will be unavoidedly affected by pre-construction activities (e.g., aggregate testing, road construction, test drilling, etc.) will be salvage excavated. Two sites are identified in conflict with the damsite.

Ancilliary Studies: The potential for supporting paleoenvironmental studies, including geology and paleoecology, within the study area will be evaluated. Additionally, the need for ethnohistoric, historical and/or archival studies will be appraised. Furthermore, the possiblity for public interpretation/presentation of select resources for local tourism and educational opportuntities will be assessed.

Reporting: A report will be prepared by December 31, 1987 detailing the results of the inventory, assessment and mitigation program. All identified resources will be assigned significance ratings according to criteria determined in discussion with the Heritage Resources Branch, Saskatchewan Parks, Recreation and Culture. The report shall contain recommendations for further assessment and mitigation work in the immediate impact areas (e.g., damsite and ancillary construction features) as well as for further survey and assessment in the reservoir. The report shall discuss the need for and means to carry out any ancillary studies.

5.2. Construction Phase

Mitigation: Based on the Year 1 assessment program, all sites judged sufficiently significant which will be unavoidably affected by immediate construction activities will be excavated in such a fashion as to obtain a representative sample of their informational content. As construction progresses, the major focus of archaeological activity will be to recover information from resources which will be inundated and/or experience shoreline erosion. Resource selection shall be made on the basis of site significance, size and complexity, and immediacy of impact.

Inventory: If necessary, additional unsurveyed areas will be sampled for the presence of archaeological resources. This program will be carried out consistent with the procedures described in Section 5.1.

Assessment: Additional resource evaluations during the inventory program may be required; if so, these studies will be carried out in conformity with the procedures described in Section 5.1.

Ancilliary Studies: If deemed appropriate by Saskatchewan Parks, Recreation and Culture in consultation with the Souris Basin Development Authority, a paleoenvironmental study will be undertaken to acquire information on the study area's geology and paleoecology. As well, any additional archival or historical research so approved will be initiated.

Reporting: Annual reports will be prepared detailing the results of the inventory, assessment and mitigation programs. All identified resources will be assigned significance ratings according to criteria determined in discussion with Saskatchewan Parks, Recreation and Culture. The reports shall contain recommendations for further assessment and mitigation work in the immediate impact areas (e.g., damsite and ancillary construction features, first stage inundation zone, etc.) as well as for further survey and assessment in the reservoir. The reports shall contain the results of, and discuss the need for and means to carry out further, ancillary studies. Site reports on all resources for which mitigatory work has been completed

should be prepared.

The results of ancilliary studies will be reported and incorporated into the overall research design.

5.3 Post-project Monitoring and Mitigation

Periodic Monitoring/Impact Mitigation: Archaeological activity following project completion will be directed to identifying any resources exposed by bank retreat or shoreline erosion; assessing the extent of impacts; and mitigating impacts to significant resources experiencing reservoir induced disturbances.

This program will be carried out on an annual basis at least three times over the 10 year period following reservoir filling.

Reporting: Final reports on the results of the impact management program, including all site reports and ancillary studies, will be prepared. These will be submitted no later than two years following the data of project completion. In addition, reports on the reservoir monitoring/impact mitigation program will be prepared as necessary.